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February 1987

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The RAINBOW®

THE COLOR COMPUTER MONTHLY MAGAZINE

Fred W. Crawford
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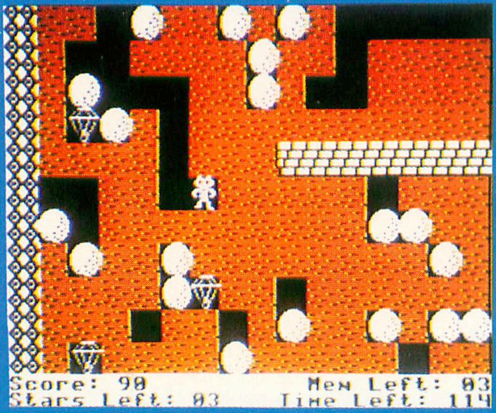

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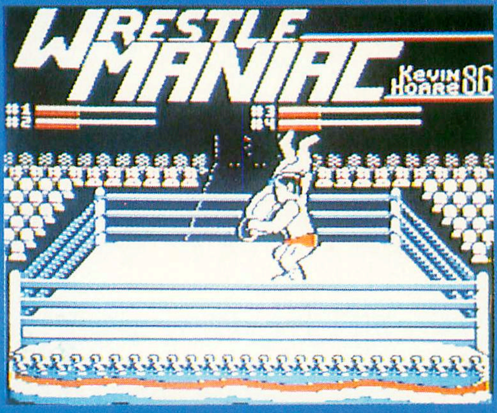

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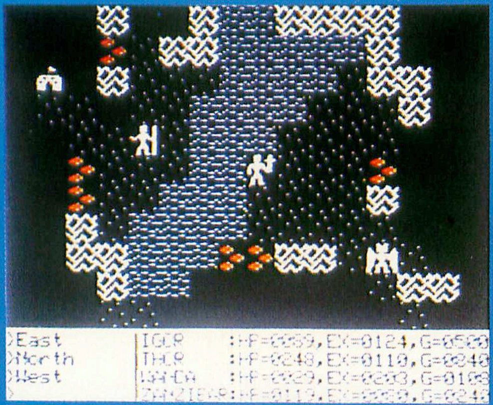

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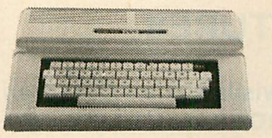

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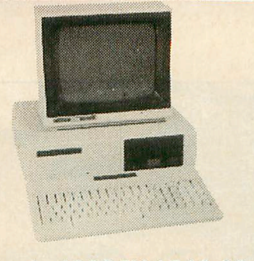

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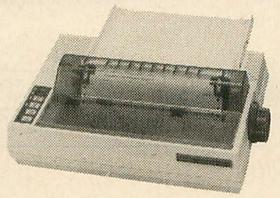

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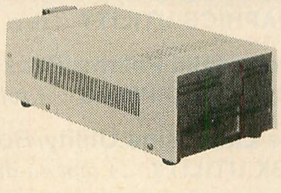

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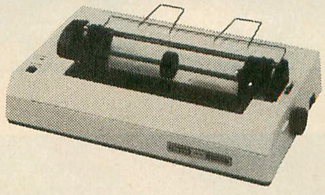

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Under The RAINBOW

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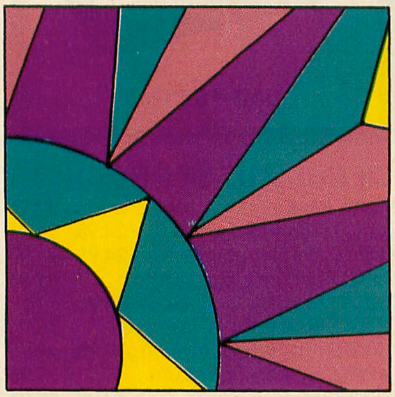
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NEXT MONTH: Whether bullish or bearish, the March RAINBOW is sure to carry something of interest for the financial genius in your home. Our focus will be on business and finance, and you'll discover again that our CoCo is more (much more) than a "game machine."

Get all the angles — get the March RAINBOW, the number one source for your Color Computers 1, 2 and 3!

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The RAINBOW

February 1987 Vol. VI No. 7

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For RAINBOW Advertising and Marketing Office Information, see Page 208

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LETTERS TO THE RAINBOW

Glad to Be of Service

Editor:

After reading RAINBOW for four years, I have to write and let you know I enjoy it very much. But I have never seen such a fine piece of workmanship as the article by Marty Goodman, "RTTY for the Color Computer" on Page 36 of the November 1986 issue. I use this program quite a lot. Thank you and I hope to see more of this kind of programming. Keep up the good work.

Gerry Farmer
Calgary, Alberta

Where Are They?

Editor:

I was searching for one-liners in my November 1986 RAINBOW, but to my surprise, I could not find even one. Did you discontinue them? Or did I just miss them?

Michael Jacobs
Brooklyn, NY

> *A one-liner junkie, eh! Well, never fear, that was just a short break. We get dozens of one-liners monthly and plan to keep publishing them indefinitely.*

BACK TALK

Editor:

In the November 1986 issue, Page 8, a reader asked about using the CoCo to control a model railroad layout. I suggest that he contact the *Model Railroad*, Kalmbach Publishing Co., 1027 N. Seventh Street, Milwaukee, WI 53233. They probably have an article in one of their back issues.

Jules Stickle
Coombs, British Columbia

COCO 3

Editor:

I'm an engineering student at Ohio State University, and my CoCo 2 served mainly as a word processor (I use *VIP Library*). The *VIP Library* seems to function on the new machine, but I have high expectations of a new "super-processor" to come out in the near future. The purpose of this letter is to simply let the software companies know that we (the new generation of CoCo 3 users) are interested in new programs and programming techniques as soon as they are available.

Randy Harrison
Columbus, OH

Didn't Have Him in Mind

Editor:

Finally! The CoCo 3 I had ordered in August was in the store waiting to be picked up. I got it Friday, returned it Monday.

I have no interest in games or graphics. I use two CoCo 2s in my business for bookkeeping, billing, record-keeping and to automate my recording studio's audio/video synchronization system. I write all my own programs in BASIC, and that's the catch.

Unfortunately, the folks at Tandy didn't seem to have had people like me in mind when they developed the CoCo 3. It offers very little that I don't already have using a 64K CoCo 2 and Computerware's excellent *Screen Expander*. All the extra memory and faster operation are not accessible from BASIC.

So how about a software package that has Hi-Res screen with simple `PRINT@(x,y)` syntax, printing at the beginning of a line that doesn't wipe out the rest of the line, all keys repeat if held down, type-ahead buffer and more memory for program and variable storage (without toggling, banking, or special commands). For 512K versions: a RAM disk that can be used as if it were Drive 3, using regular Disk BASIC commands, and a print spooler.

In short, could somebody market a program that would make the CoCo 3 as exciting for a BASIC user like me as it is for the rest of the CoCo Community?

Rob Edward
Greenwich, CT

The Primary Guide

Editor:

Being the new owner of a CoCo 3, I would like to make a few comments on my experiences. First, I was pleased to find a large number of my CoCo 1 software would run on CoCo 3. These included *Telewriter 64, Spectaculator, Grafplot, DeskMate, Ark Royal* games, etc. One program that would not run was my *VIP Database*. Softlaw told me they had no plans for CoCo 3.

I have also received no help from the local Radio Shack centers, who seem to be uninformed about CoCo 3 capabilities, software changes, or when OS-9 Level II will be available. Regarding any technical questions, I am usually referred to Fort Worth Headquarters (with a toll number, of course). It seems to me that the advice available from Radio Shack centers has deteriorated significantly since I bought my first CoCo in 1981.

Once again, we CoCo users can be very thankful for THE RAINBOW. You are the only source of information we need to achieve the full capability of our favorite computer. The manual for CoCo 3 does not even mention how to gain use of the full 128K. The excellent articles that have appeared in RAINBOW since the CoCo 3 debut have served as the primary guide to the CoCo 3.

Mel Siegel
North Palm Beach, FL

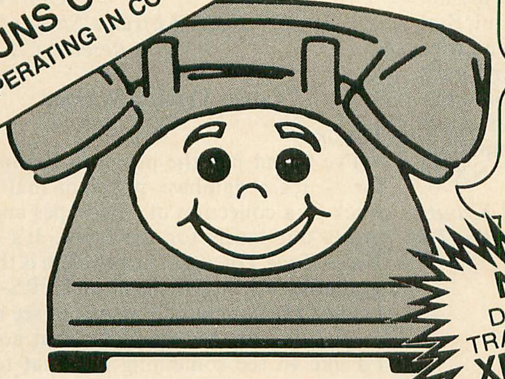
Some Tips to Pass Along

Editor:

I have been working with my new CoCo 3 and would like to pass along some observations.

The 16K version of JDOS (Version 1.23) is not compatible with the CoCo 3 in the 64K mode (the mode at power-up). If you have JDOS disks, the `COPY` command seems to work, as does `DSKINI`, so you can copy your files individually from a JDOS disk to an RS-DOS disk. `LOAD` and `LOADM` do not work; neither does `DOS`. The reason for this seems to be that on the new CoCo, only the first 8K of the cartridge memory is reserved for ROM packs. The upper 8K is dedicated to the Super Extended BASIC. However, I

RUNS ON COCO 3
OPERATING IN COCO 2 MODE



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PUTTY IN YOUR HANDS

The word processor can be used to create, print, and/or save on file your personal KSMs. They let AUTOTERM act like you. For example, it can dial through your modem, sign-on, interact, perform file operations, & *sign-off; an* entire session without your help. KSMs can answer the phone, prompt the caller, take messages, save them, hang-up, and wait for the next call. The KSM potential is unbelievable!

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tried `POKE &HFFDE`, converting to the 32K mode, and all the JDOS commands seemed to work.

When operating with JDOS, the new Super Extended commands will not work, and they will not be converted to the proper codes if you are writing a program under JDOS. If you write a program under JDOS, using the new commands, you can save the program in ASCII format under JDOS and then load it under RS-DOS and it will work.

OS-9 Version 01.01.00 will not boot, but Version 02.00.00 will. I had hoped that the 80-column driver would work with the new CoCo, but it doesn't.

In the October 1986 issue, Marty Goodman stated that *VIP Writer* would not work on the CoCo 3, but I have not had any problems with it yet. [Some versions work; some don't. See Jim Reed's column in the January 1987 issue.] I have loaded old files, etc., and they work fine — that is, if you don't try to load while the 40- or 80-column screen is in effect.

One nice feature of the new system is its error-trapping routine. This goes a long way in smoothing out the operation of a program since crashes can be bypassed when errors are encountered. However, the manual supplied with the computer gives only the codes for the BASIC errors (see Page 321), and did not give the codes for disk errors, which, to me, is where the codes really fulfill their purpose. By experimenting, I found most of the codes. I will give the numbers with the symbols, but will not attempt to explain them.

25=UF
26=NE
27=BR
28=DF
29=OB
30=WP
31=FN
32=FS
33=AE
34=FO
35=SE
37=ER

This sequence follows the same order as JDOS, so I would suspect that Error 36 should be VF.

After setting up an error trap, it can be turned off later in the program by inserting the command `ON ERR GOTO 0`. This puts you back in the normal mode in which the program is aborted and the error message is displayed.

David Breeding
Russell Springs, KY

HINTS AND TIPS

Editor:

I've noticed from time to time, people writing in seeking help dumping graphics to the DMP-110. Put the printer into elongation mode before initiating the dump.

David Nicol
Pacific, MO

CoCo Max Compatibility

Editor:

I recently obtained *CoCo Max* for use with my 64K CoCo 2 and Star NX-10 printer. The results have been fantastic. Initially, a problem arose with *CoCo Max*'s compatibility with the new Star NX-10 printer. The printer was not shown or listed as being supported and Colorware could not offer any suggestions. I was surprised and somewhat dismayed that *CoCo Max* did not work by entering the other Gemini/Star printers as given. I took a long shot and tried it with the Epson FX series (printer Line 5 in the program) and it worked! I would like to pass this on to any others who might initially experience *CoCo Max* compatibility problems with the new Star NX-10 printer.

Phil Kyburz
Amarillo, TX

Under Separate Covers

Editor:

I'm a 13-year-old CoCo 2 owner and I've had my computer for two years. The RAINBOW ON DISK is great, but one thing bothers me. Why can't you send the disk with the magazine?

Paul Michael Dumin
Southington, CT

RAINBOW magazine is published and printed in Louisville, Kentucky, while the disks are produced in another state. The magazine is shipped second class mail, while the disks are shipped by first class mail.

REQUEST HOTLINE

Editor:

I would like to request that readers who have a video digitizer please send me a printout of a picture made using the digitizer. Please include what digitizer, printer and camera you used.

Kevin Mortenson
254 Clinton Street
Binghamton, NY 13905

Educational Software Hunt

Editor:

I'm looking for educational software focusing on calculus, mechanics and thermodynamics for mechanical engineering studies at a university. How do I locate information on how to purchase this type of software?

Bill Snyder
565 Leighton Avenue
Youngstown, OH 44512

Keeper of the Troops

Editor:

I'm looking for software that can run records for my Boy Scout troop. I can only find the type that will run on Apple, IBM or Commodore. Does anyone make it for the CoCo?

Louis D. Cioccio
2603 Jackson Avenue
Erie, PA 16504

Lamborghini Challenge

Editor:

I am looking for an artist who will take up the challenge to draw a Lamborghini Countach. For a long time I wanted to see my favorite computer draw my favorite car. If anyone wants to give it a shot, write me.

Omri Goren
18933 Kittridge Street, No. 64
Reseda, CA 91335

CoCo Version Wanted

Editor:

I've found just the program I'm looking for — it's a database program that keeps track of a collection of videotapes and also prints out labels for the tapes. It's called *Video Tape Tracker*. The problem is that it's available only in MS-DOS and TRS-DOS. I called the company, Prosoft, to see if they made a version for the CoCo, but no luck. I'd like to see something like that for the CoCo. Some of you software entrepreneurs develop such an animal. I'm sure you'd find a market, especially with the assured popularity of the CoCo 3!

Paul Whiting
2330 Lakeland Avenue
Madison, WI 53704

INFORMATION PLEASE

Editor:

I have been delighted with the use of Harry Hardy's programs *INIT36* and *HIDEDIR* that were published on Page 46 of the October 1983 issue. Has anybody modified the two programs to save the spare directory on a 40-track drive? If anyone can help in this endeavor, please write to me.

James K. Knight
11403 48th Drive N.E.
Marysville, WA 98270

Lost Without a Map

Editor:

Is it possible to publish the complete memory map to the CoCo 3? I'm a technician to the College de Granby and I want to introduce the advantage of the CoCo 3. I write many programs in machine language and the memory map would be helpful to me.

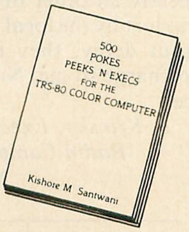
Martin Scott
233 Roy
Granby, Quebec
Canada J2G 5R6

We have considered publishing an article about the CoCo 3 memory map, however, such an extensive report would have to be done over a period of several months and would take many pages. It is unlikely in the near future. We do ask that you watch for separate publications dealing with such subjects advertised in future issues of THE RAINBOW.

For your information, we did publish a complete memory map of the Color Computer in the July, August, September and December 1983 issues of RAINBOW. While this series by Bob Russell will be of little assistance, it will give you some idea of the breadth of the project.

500 POKEs, PEEKs, 'N EXECs

FOR THE TRS-80 COCO



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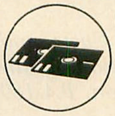

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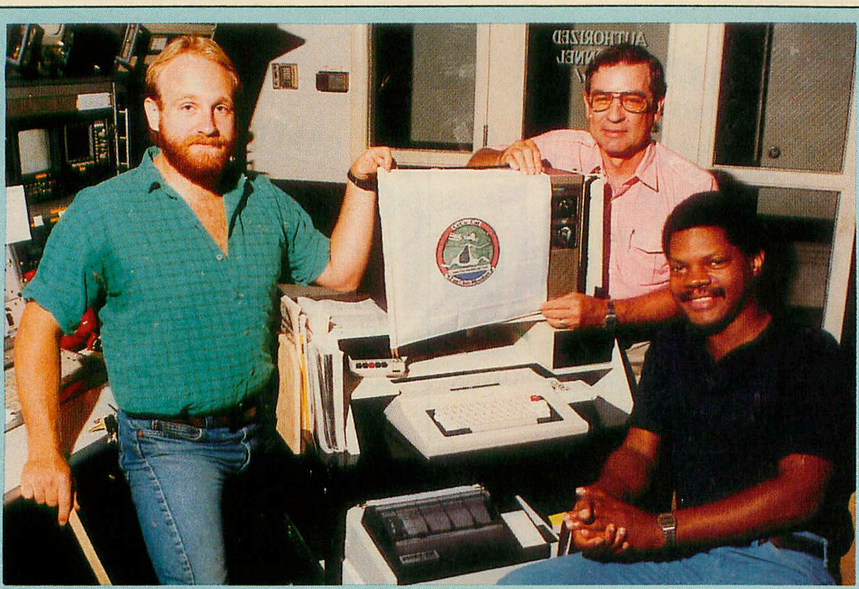


CoCo Cat Art

Editor:

CoCo Cat behind the scenes at WPSD-TV, Channel 6, Paducah, Ky. Engineers (l-r) Joey Gill, Jim Franklin, Doug Sanders and John Bartlett (absent) use the CoCo as an engineering tool to do such things as satellite dish controller, drawing master video/audio diagrams and data basing area frequency coordination lists.

Engineering Department
WPSD-TV
Paducah, KY

Tractor-Feed Trauma

Editor:

I have all TRS-80 equipment which I use to run my computer service bureau. I use a DWP-210 printer to do much of my word processing work on, and I am pleased with how well it works for me. I am currently looking for a tractor-feed mechanism for my DWP-210 and am having trouble locating one. If any readers would happen to know where I could get a tractor-feed for my printer, I would appreciate hearing from them. Call me at (605) 225-9707 or write me.

Donald J. Floodeen
514 S. 3rd Street, Apt. 3
Aberdeen, SD 57401

WarGame On Disk?

Editor:

After looking through my old RAINBOW ON TAPES, I saw one of my favorite games, *WarGames* [November 1983, Page 90]. Then I remembered why I hardly play that game any more — it takes so long to load from tape. I worked with it and almost got all of it to run on disk. I was wondering if anyone else has tried and succeeded to get *WarGame* to work on disk. Any help would be greatly appreciated. I'm glad to see you came out with RAINBOW ON DISK!

Mike Brattain
6004 Westhampton Drive
Ft. Wayne, IN 46825

Networking Troubles

Editor:

I am involved in Color Computer use in education through the Easton Catholic Network System. We are having some problems with it and I am asking if anyone who reads RAINBOW could help us. It would be most appreciated.

Thomas J. Castronuova
368 E. Nesquenhoning Street
Easton, PA 18042

Scheming for a Light

Editor:

I am building a light pen for my CoCo. Does anyone have a schematic to use a photo-transistor as a light pen? If so, please send me a copy.

Ray Knoch
Box 551
Lawson, MO 64062

Friends in Need

Editor:

The Kadima School for Special Children, located in Israel, just had a catastrophe. Our three CoCos have died due to a faulty drive controller. With no available funds, and now without our computer, we need the help of the CoCo Community.

If anyone wishes to donate a Color Computer and/or drive controller, we would gratefully appreciate it. We would send a receipt of a donation (tax deductible in the USA and England) for the full purchase price of the machine, including shipping. Please mark all packages "Gift," and on the customs form write the current resale value.

I wish to compliment Linda and company at Moreton Bay Software. Not only is their service the best available to the CoCo Community, but they are also just nice people. Recently an order of Moreton Bay Products was lost by the local postal authorities. Without delay, they reshipped the order, at no charge to me. Now that's what I call service.

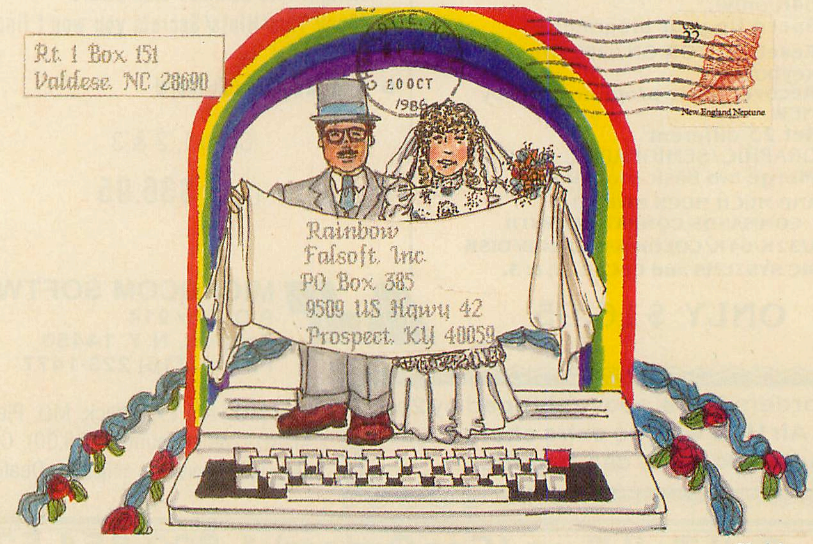
J. Krinsky, Executive Director
Radin Campus, POB 4177
Netanya, Israel

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

Letters to the editors may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

Continued on Page 172

ARTS AND LETTERS



Envelope of the Month *Valdese, NC*

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Promoting CoCo — Everyone's a Winner

We got into a lively exchange of messages on Delphi the other night concerning the Color Computer (what else?) and how we might help promote it. One of the things people were saying was that they sure wished we could work with sales personnel at Radio Shack stores to "educate" them into selling CoCos.

It is always dangerous when someone bounces an idea off my head. The reason for this is simply that I tend to come up with more ideas and then, often, things get out of hand. In this case, though, I think the idea that we all seemed to come up with is a pretty good one, and it's one you can participate in as well.

One of the "other" things I do is fly an airplane and, as such, I am a member of the Aircraft Owners and Pilots Association (AOPA), a group of people who fly light planes (as opposed to big jets) around in the sky. One of the interesting relationships in the aviation field is between air traffic controllers and light plane pilots. They very much (as they should) depend on one another, but sometimes they get at odds, too.

AOPA came up with a good program a few years back called something like "Fly A Controller." Under the plan, private pilots have been encouraged to offer a ride to ATC personnel in an effort to give them a chance to "see" flying from the "other side."

According to all reports, this has been a good program for all concerned. The AOPA members have gotten to know — and understand the problems of — ATC personnel on a personal basis. By the same token, controllers have had the opportunity to see what it is like to deal with instructions and directions from the cockpit.

AOPA even has a small area of its monthly magazine devoted to reports from both controllers and pilots. I read these regularly, because oftentimes some of the comments are very interesting indeed.

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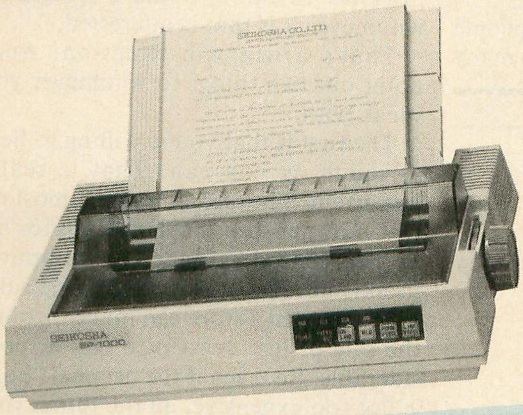

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- A variety of print character sets including Pica, Elite, Italics, Super/Subscripts, Proportional, Elongated, Condensed, and Italic Super/Subscripts.
- Standard 1.5K buffer.

Printer is covered with a two-year warranty.

Model 101 Interface $39.95

MODEL 101 INTERFACE

The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). The 101 is only 4″ × 2″ × 1″ and comes with all cables and connectors for your computer and printer.

Model 102 Switcher $35.95

The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

The Model 104 Deluxe Interface $51.95

METRIC INDUSTRIES

The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5″ × 2.5″ × 1.25″ and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.

Cassette Label Program $6.95

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This fancy printing utility prints 5 lines of information on pinfeed cassette labels. "Cassette Label" is menu driven and is very easy to use. It uses the special features of your printer for standard, expanded or condensed characters. Each line of text is automatically centered. Before the label is printed, it is shown on your CRT — enabling you to make changes if you like — then print 1, 2 or 100 labels. The program comes on tape and it is supplied with 24 labels to get you started. 16K ECB required.

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The Model 101, 102, and 104 work with any COCO including COCO3, any level basic and any memory size. These products are covered by a **1 year warranty.**

The 101 and 104 require power in order to operate. Most printers can supply power to your interface. Star, Radio Shack, and Okidata are just a few that do. Epson and Seikosha do not. The interfaces can also be powered by an AC adapter (Radio Shack Model 273-1431 plugs into all models). If you require a power supply, add a "P" to the Model number and $5.00 to the price (Model 101P $44.95, MODEL 104P $56.95).

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Call for prices on the SP-1000A and other Seikosha printers.

I thought about this program as the discussion was continuing on Delphi. Then I recalled we did something very much like this several years ago, when the original Color Computer came out. There were a lot of people excited about the CoCo — and quite a number of them spent some time in their Radio Shack stores and computer centers infecting store personnel with that same excitement.

> ***"A number of Color Computer Clubs have become strong by working with people in their local Radio Shack stores."***

Some of those relationships last until this day. A number of Color Computer Clubs have become strong by working with people in their local Radio Shack stores. Store personnel have directed new CoCo owners to users groups when they sold computers. A few clubs even have "designated salesmen" to whom they direct business. These salesmen are usually very CoCo-oriented.

It strikes me that we can do this all again, and that it is very much like the AOPA program. As with everything, something like this has to be a win/win situation — but there is no reason it should not be so. Let's look at it for a moment.

Of course, we all want more people in the CoCo Community for so many reasons it would be almost silly for me to enumerate them. At the same time, a Radio Shack salesperson is interested in making sales — and commissions. Obviously, the two go together.

May I suggest that each of you — individually or through your club, if you belong to one — take 10 to 20 minutes out and stop by your local Radio Shack store (of whatever kind). Tell the store manager you'd like to help him generate some business and ask whom you could work with. Then help. Make sure you answer any questions (or find someone who can). Tell them about your club (if you belong to one). And promise to direct some business to whomever it is that is interested.

That's a win/win situation. And, point out two things to whomever you speak with.

The first is that you're willing to help as much as you can. That is really important. The second is that almost no CoCo owner stops buying things for his or her computer once the computer itself is purchased. The additional sales any person in a store can make through the sale of just one CoCo can be considerable. So, even if the original "box" is not too expensive, all the things that will be bought for that "box" over the years can add up to significant commissions for the salesperson who is interested and develops a rapport with the typical CoCo owner.

Let me know how things work out. As I said, you can do this through a club or on your own. One thing is for sure, you'll be doing something to help the CoCo Community grow and you will be enabling more people to learn about our wonderful computer. I think it will benefit all of us.

And let me know how it works out. We'll run some of your responses in our "Letters" column.

— Lonnie Falk

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BUILDING FEBRUARY'S RAINBOW

We've come a long way, CoCo . . .
. . . and there's a long way to go.

It seems that what I need is a CoCo 3 mode for my old CoCo. Now, I could "get into" that. Yeah, I know all that stuff about it not being economically feasible, but it would give me a real kick to flip a toggle switch on the side of my "CoCo 1" and have it shift into a full-blown CoCo 3 emulation.

Hmmm, maybe I could bolt a CoCo 3 on the bottom side of my computer desk and run a few more wires into the back end of my present CoCo. "What is he talking about?" you ask. Well, the truth is, I have been sort of dragging my heels about getting a CoCo 3. Yep, it appears that the managing editor of RAINBOW may be the last kid on the block to get a new machine.

While two new Color Computer 3s are waiting, in the box, right outside my door, I still have a CoCo 2 in my office and my faithful first CoCo at home. Even though Cray, Dan, Jutta and even Angela and Jody latched onto 128K and 512K CoCo 3s here at the office like hungry hounds on a meat wagon, I'm still a holdout. People are beginning to talk, too. I feel like the last bottom-land farmer who refuses to move out to make way for the TVA. "Poor Jim," they must be saying, "he just won't go with the flow."

Well, why should I? I mean, I didn't spend four years with my battle-scarred veteran just to chuck it aside and replace it with some shavetail rookie fresh off the boat. I feel like that guy in the Midas TV commercials who is still driving "Ol' Betsy" and still cashing in on that lifetime muffler guarantee. The biggest difference is that my machine (no, I haven't named it) has never been in the shop since I first took delivery of it in Lonnie Falk's basement. Yessir, my ol' buddy, Dr. Doom, and I both got 16K CoCos for our birthdays and Bob Rosen himself had added 32K "piggyback" upgrades to each. Since that time, my CoCo's gone through some changes, that's for sure: lowercase board, 64K chips, new keyboard, you name it. And, far from slowing down with age, my CoCo's just as fast as it ever was, has a much better memory, does more than it ever did and learns new tricks every day. So, we're not ready to part company by any means. We go back a long way and we have the momentum to keep forging on, too.

Without getting maudlin about a plastic shell full of silicon, I do have a soft place in my heart for my *numero uno*. And, while it is inevitable that the playful puppy of a new machine, with its own special appeal, eventually will find a way to my heart, too (I do like that 80-column text mode), I'm not going to cast my old CoCo aside any more than I'd trade in my loyal, gray-muzzled Newfoundland, Onyx, for some new, improved model of dog.

Why am I telling you all this? Just so *you'll know that we know* there's plenty of life left in our CoCo 1s and 2s and that, as attractive as that new model is, as long as this "ol' Sarge" is M.E. of this outfit, RAINBOW's going to keep marching to the same drummer who got us here and nobody's going to fall out of the ranks.

So, old soldier or new recruit, if you want to get into step with the CoCo Community, why not ease into the rhythm with a year's subscription? It provides a once a month cadence that's hard to beat: CoCo 1, 2, 3, CoCo 1, 2, 3, CoCo 1, 2, 3 . . .

— Jim Reed

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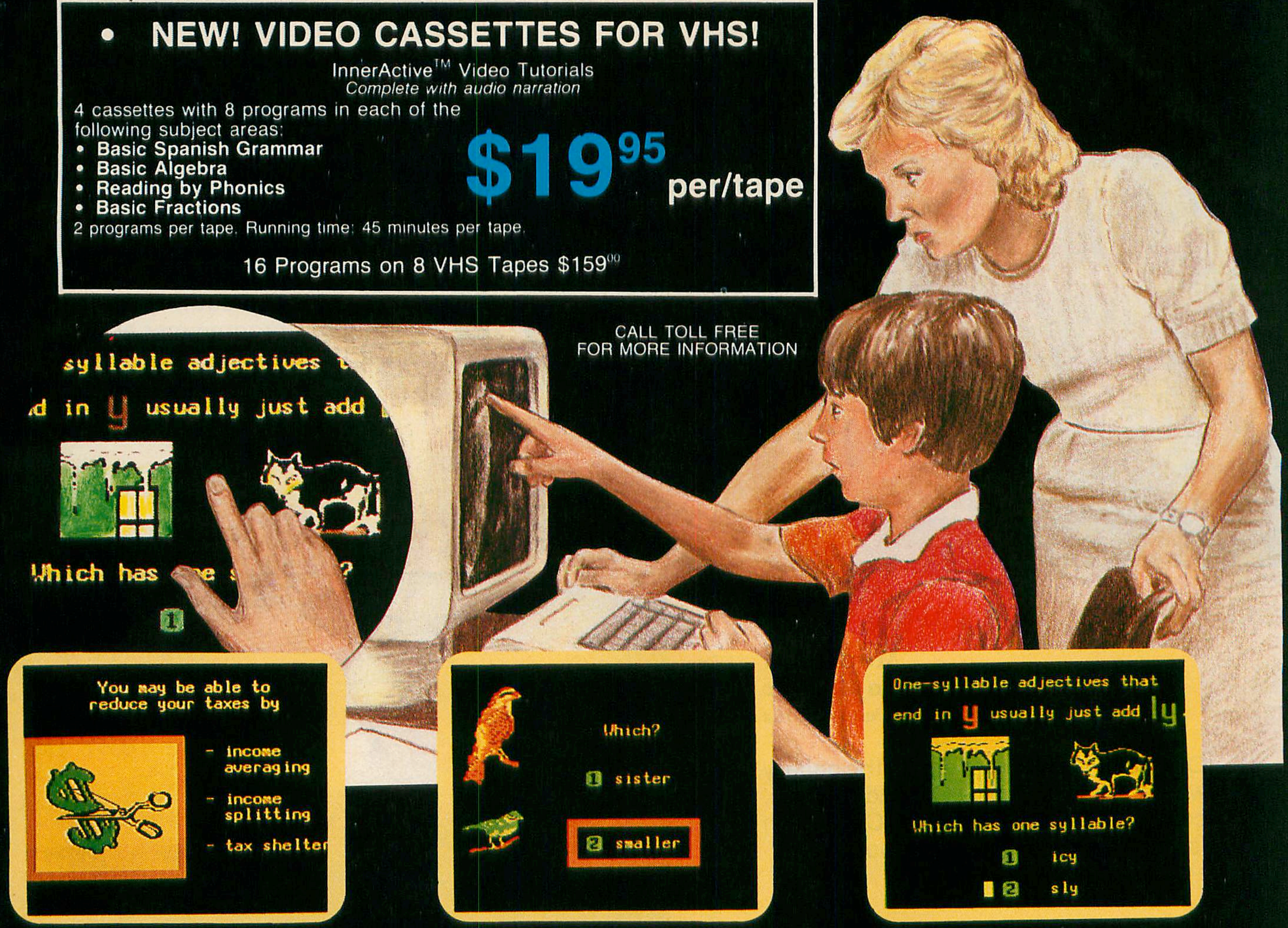

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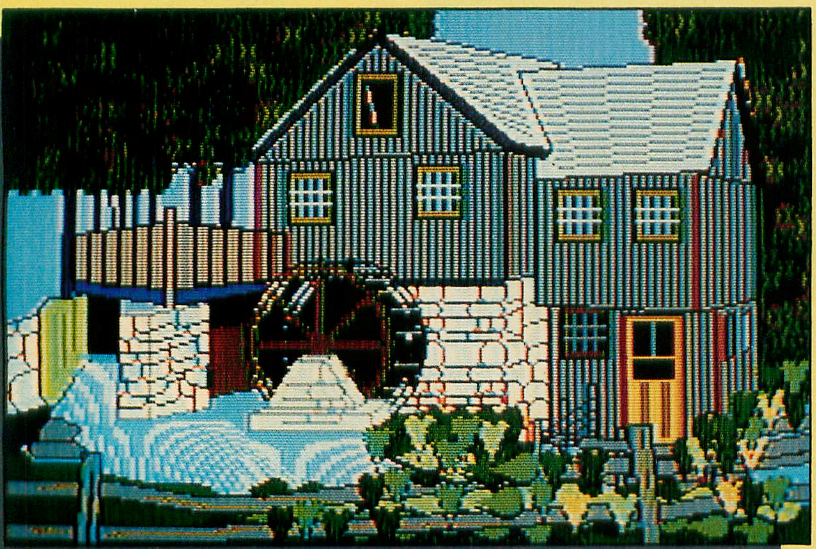
The CoCo Gallery



1st PRIZE

Jenny Grist Mill

John Murvine

Edensburg, Pennsylvania

This wonderful picture was created with BASIC on one of the new CoCo 3s. The Jenny Grist Mill is a real mill located in Plymouth, Mass. John is a self-taught programmer and commercial artist.

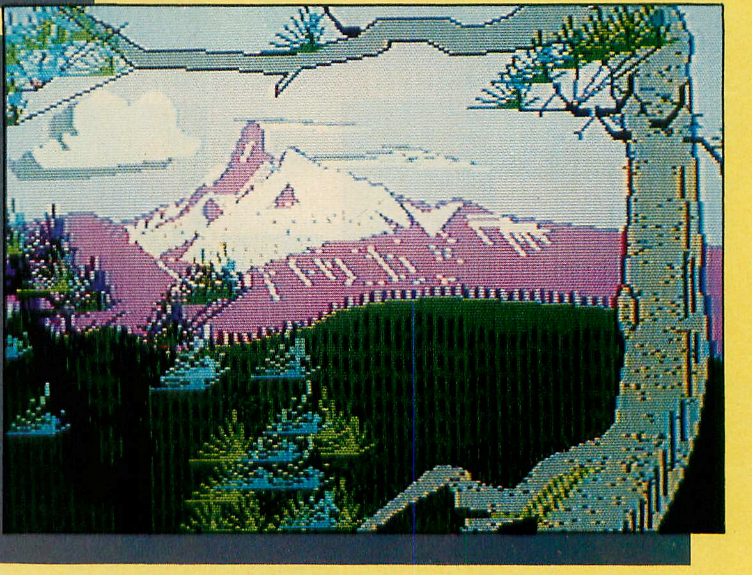
2nd PRIZE

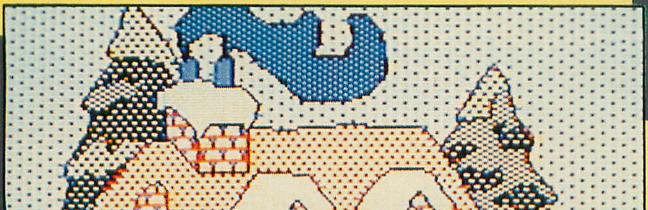
Mountain

John Murvine

Edensburg, Pennsylvania

Once again, John enhances the gallery with a scene from the Cascade Range, created with BASIC on his CoCo 3. John is also the owner of Cylon Software.





3rd PRIZE

Maison

Claire Beaupre

Montreal, Quebec

Claire designed this winter scene to use as one of her Christmas cards. *Maison* was created with *CoCo Max* and *Color Designer*. Claire is a laboratory technologist of clinical chemistry in a hospital.

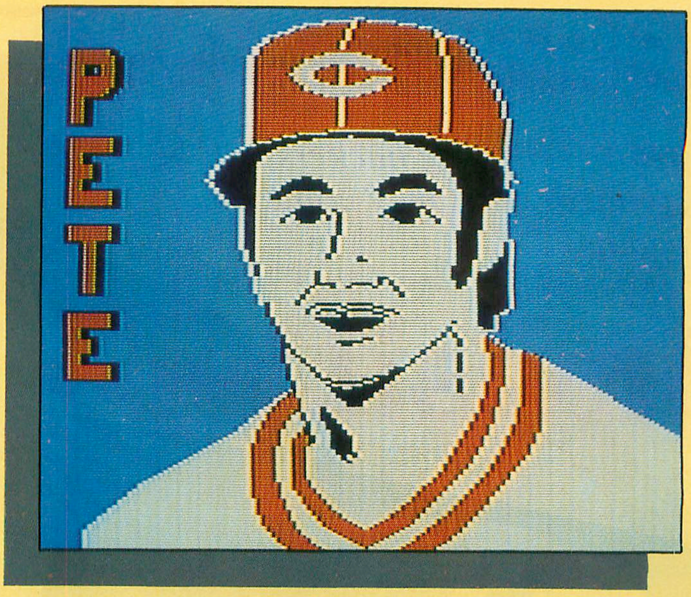
Pete Rose

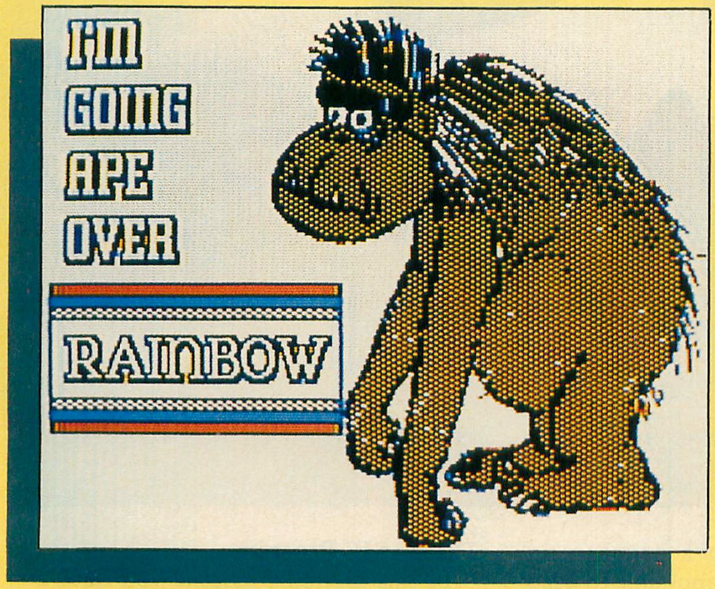
Wally Mayes

Hamilton, Ohio

HONORABLE MENTION

One of baseball's most valuable player/managers is depicted here in the gallery, and was created with BASIC. Wally is new to the CoCo Community, and purchased his 64K CoCo 2 a few months ago. He also noted that most of what he has learned has been from Fred Scerbo's "Wishing Well."





Ape

Jeff Brown

Findlay, Ohio

HONORABLE MENTION

This humorous graphic was created with *CoCo Max* and says just about what we all think of THE RAINBOW. Jeff plans to attend Ohio State University and take computer graphics-related courses.

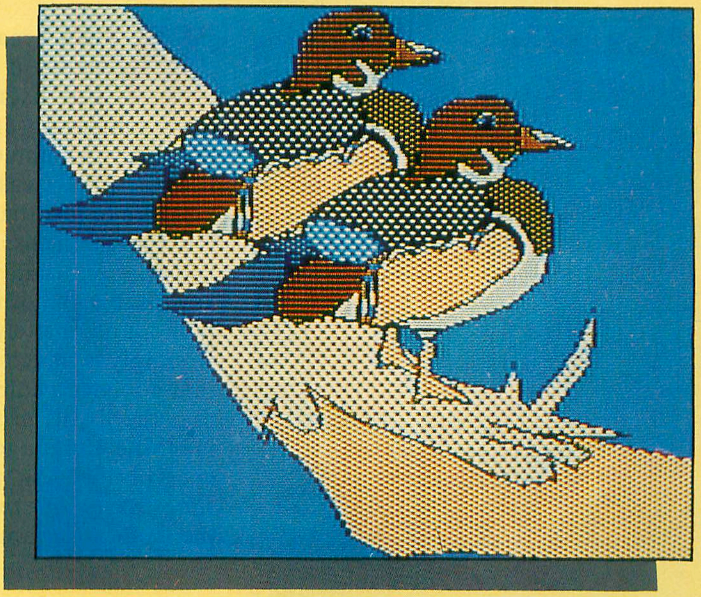
Birds

Charlie Fulp

South Boston, Virginia

HONORABLE MENTION

Charlie is attending Danville Community College to obtain a degree in engineering and created this drawing of the birds with *CoCo Max*.



SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, *please* include several facts about yourself, the more the better.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

Jody Doyle, Curator

Send your entry on either tape or disk to:
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THE RAINBOW
P.O. Box 385
Prospect, KY 40059
Attn: Jody Doyle

PROGRAM UTILITY

16K
Disk

Those renegade hackers will be stymied when they come up against . . .

InvisiList

00390
00395
0400
410
+2,X
,Y
START
EDURE
$1B
PUT END LOC
25E
00000 TOTAL

By Glen Dahlgren

When creating a program in BASIC, it is impossible to keep out users, or safeguard it from tampering and having someone put their own name in it.

Load Mask was made as a counter measure to just that. Until the program is executed, the user has no way to enter and change it, and afterward, a BREAK key disable and other routines can keep him out completely. The program itself is simply a machine language loader that fools the computer into thinking that the BASIC program in memory is machine language. This loader also encrypts the BASIC program using a very simple technique that stops the listing of the BASIC program after it is loaded.

Glen Dahlgren has created many professional games for the CoCo including Hall of the King, Dragon Blade *and* White Fire of Eternity. *He is currently a student at Penn State College. His non-computer interests include fantasy/science fiction role playing and racquetball.*

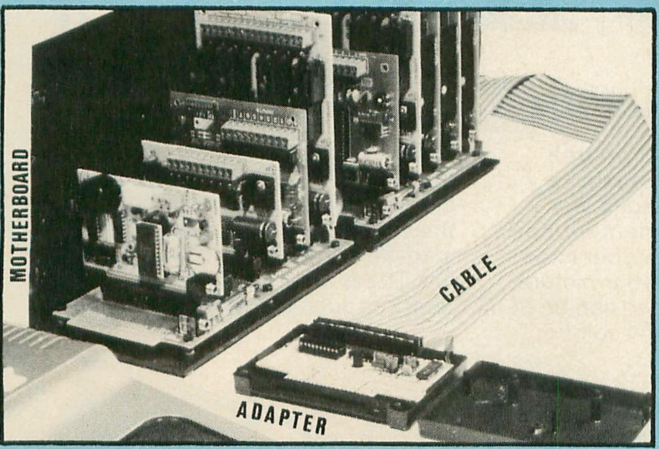
The BASIC Program

In this section I assume you have a disk-based system. This is different from the tape system because of where the CoCo locates the BASIC program. In the disk-based system, the computer throws the program to the end of graphics memory ($E00-$25FF on startup). This can be changed later by the PCLEAR command within the BASIC program, but not before the program is run. This is because the memory ($2500-$25FA) is used for the ML loader and can be written over *after* the BASIC program is loaded and run, but not before. Therefore, a program that clears memory before the program is run using the PCLEAR command or the various pokes (POKE 25,6:NEW, etc.) cannot use this loader.

Now we have established where the BASIC program starts, ($25FF) but not where it ends. The CoCo has a place in memory where it keeps track of the start and end of the BASIC program. This area is drawn on from the loader to configure it to encrypt only the part of memory that holds the BASIC program. You must also access this information, but I'll tell you how to do this later.

The Amazing A-BUS

NEW



An A-BUS system with two Motherboards
A-BUS adapter in foreground

The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.

Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to *build* your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

Relay Card RE-140: $129

Includes eight industrial relays. (3 amp contacts. SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card RE-156: $99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card AD-142: $129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter AN-146: $139

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

Digital Input Card IN-141: $59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O DG-148: $65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

Clock with Alarm CL-144: $89

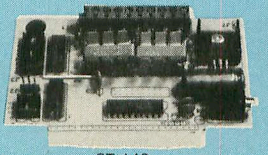
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

Touch Tone® Decoder PH-145: $79

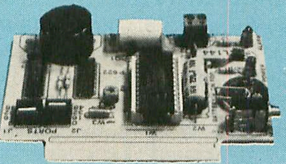
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

A-BUS Prototyping Card PR-152: $15

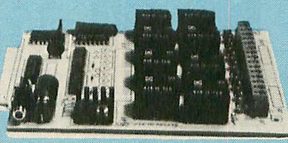
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s



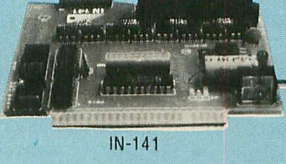
ST-143



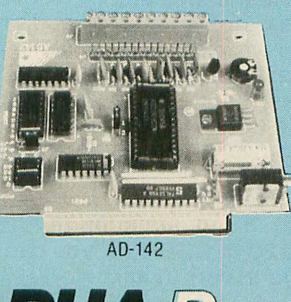
CL-144



RE-140



IN-141



AD-142

Smart Stepper Controller SC-149: $299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option RC-121: $49
To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option PD-123: $89
Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option BB-122: $19
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver ST-143: $79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).
Special Package: 2 motors (MO-103) + ST-143: **PA-181: $99**

Stepper Motors MO-103: $15 or 4 for $39

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

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Apple II, II+, IIe. Uses any slot.	AR-134...$49
TRS-80 Model 102, 200 Plugs into 40 pin "system bus".	AR-136...$69
Model 100. Uses 40 pin socket. (Socket is duplicated on adapter).	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable).	AR-132...$49
TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed).	AR-137...$62
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Color Computers (Tandy). Fits ROM slot. Multipak, or Y-cable.	AR-138...$49

A-BUS Cable (3 ft, 50 cond.) CA-163: $24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.
Special cable for two A-BUS cards: CA-162: $34

A-BUS Motherboard MB-120: $99

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

- The A-BUS is not a replacement for the Multi-pak

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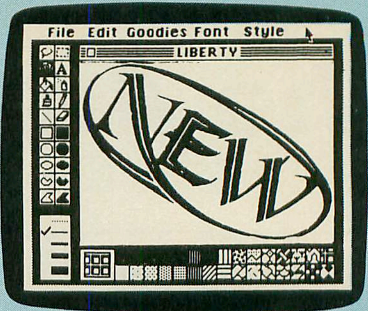
CoCo Max™ II



You'll use it all the time and love using it.

What is CoCo Max ?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.

CoCo Max disk system, with Y-cable.

Is CoCo Max for you ?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success ?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply ***pointing*** and ***clicking*** with your mouse or joystick. With ***icons*** and ***pull down menus,*** you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The ***undo*** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

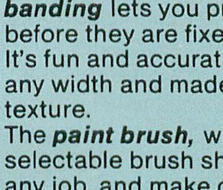
With the ***pencil*** you can draw free hand lines, then use the ***eraser*** to make corrections or changes. For straight lines, the convenient ***rubberbanding*** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The ***paint brush,*** with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

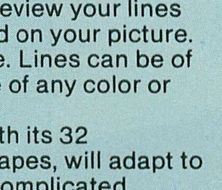
For special effects, the ***spray can*** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The ***Glyphics*** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom in !

Control Over Your Work

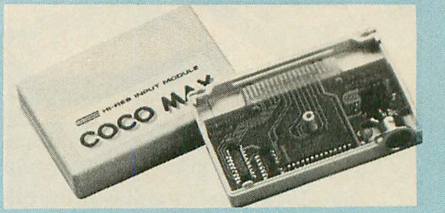
CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats: • You can move it around • Copy it • Shrink or enlarge it in both directions • Save it on the electronic ***Clipbook*** • Flip it vertically or horizontally • Rotate it • Invert it • Clear it, etc. etc.

All this is done instantly, and you can always ***undo*** it if you don't like the results.

For detail work, the ***fat bits*** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color !

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible ***lasso***.



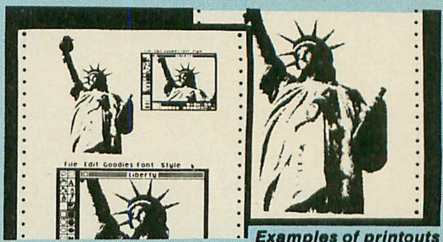
Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack ?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in ***fonts*** each with 16 variations. That's over 200 typestyles !



Examples of printouts

Printing Your Creations

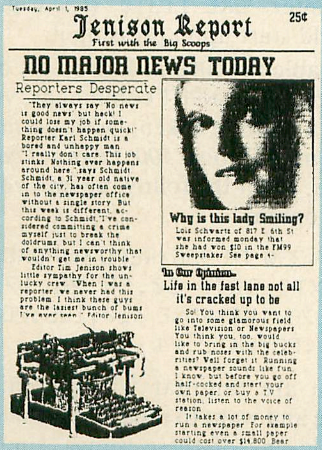
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers !

All the CoCo Max pictures are **unretouched** screen shots or printouts (Epson RX-80).

CoCo Max II™

The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are **unretouched** screen photos or printouts (on an Epson RX-80).


Tuesday, April 1, 1985

25¢

Jenison Report

First with the Big Scoops

NO MAJOR NEWS TODAY

Reporters Desperate

"They always say 'No news is good news' but heck! I could lose my job if something doesn't happen quick!" Reporter Karl Schmidt is a bored and unhappy man "I really don't care. This job stinks. Nothing ever happens around here.", says Schmidt. Schmidt, a 31 year old native of the city, has often come in to the newspaper office without a single story. But this week is different, according to Schmidt,"I've considered committing a crime myself just to break the doldrums, but I can't think of anything newsworthy that wouldn't get me in trouble."

Editor Tim Jenison shows little sympathy for the unlucky crew. "When I was a reporter, we never had this problem. I think these guys are the laziest bunch of bums I've ever seen." Editor Jenison

Why is this lady Smiling?

Lois Schwartz of 817 E 6th St was informed monday that she had won $10 in the FM99 Sweepstakes. See page 4-

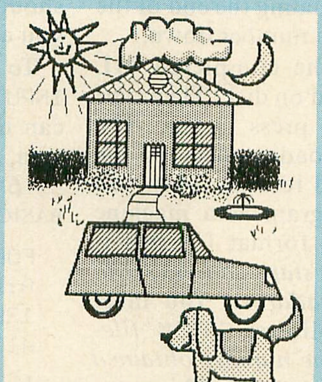
In Our Opinion.

Life in the fast lane not all it's cracked up to be

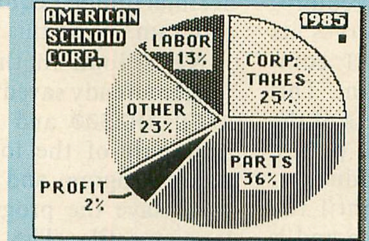
So! You think you want to go into some glamorous field like Television or Newspapers. You think you, too, would like to bring in the big bucks and rub noses with the celebrities? Well forget it. Running a newspaper sounds like fun, I know, but before you go off half-cocked and start your own paper, or buy a T.V. station, listen to the voice of reason.

It takes a lot of money to run a newspaper. For example starting even a small paper could cost over $14,800. Bear

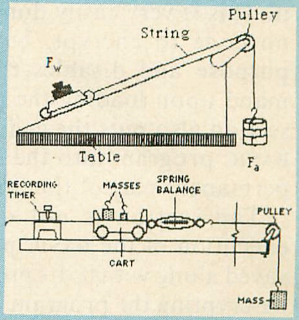
❶ ***Publish a newsletter or bulletin***



❷ ***Fun for children while stimulating creativity.***

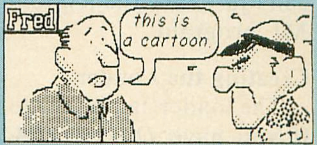


❸ ***Business graphs, charts, diagrams. Also memos***

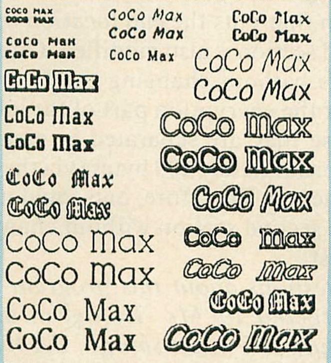


❹ ***Junior's homework and science projects. Term papers too!***

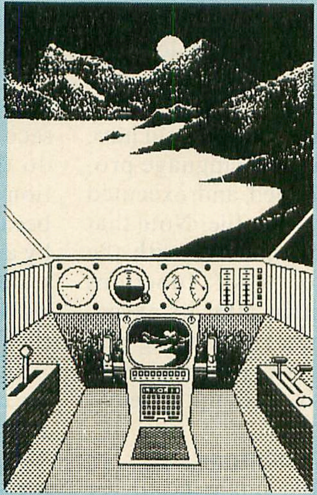
❼ ***Video portrait (with optional digitizer).***



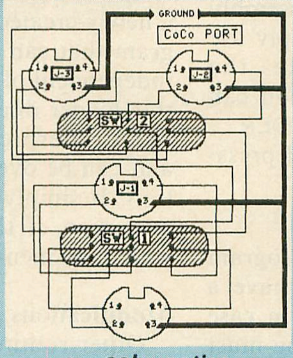
❽ ***This is a cartoon.***



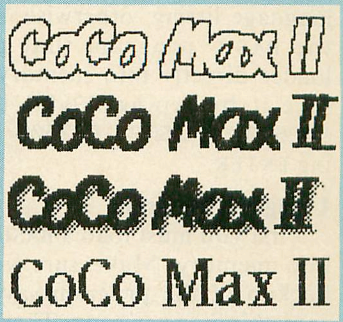
❺ ***Over 200 typestyles to choose from! generate flyers.***



❻ ***A new way to express your imagination.***



❾ ***schematics and floor plans.***



❿ ***Logos and letterheads.***

System Requirements:

Any 64K CoCo and a standard joystick or mouse. (The koala pad and the track ball work, but are not recommended.)

Disk systems need a Multi-Pak or our Y-Cable.

CoCo Max is compatible with any Radio Shack DOS and ADOS.

Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except *Shrink, Stretch, Rotate,* and *Glyphics.* Also, it has 5 fonts instead of 14.

CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10, Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220. (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana.

Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape .... with Hi-Res Pack and manual.	$69.95
CoCo Max II (disk only).......... with Hi-Res Pack and manual.	$79.95
Upgrade: CoCo Max to CoCo Max II New disk and manual......................	$19.95

New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.

Upgrade: CoCo Max tape to disk manuals, disk and binder	$24.95
Y-Cable: *Special Price*..........	$19.95
Super Picture Disks #1, #2, and #3 each:	$14.95
All three picture disks	$29.95

Guaranteed Satisfaction

Use CoCo Max for a full month.

If you are not delighted with it, we will refund every penny.

Font Editor Option

A font is a set of characters of a particular style. CoCo Max includes 15 fonts. You can create new fonts of letters, or even symbols or graphics with the font editor. Examples: set of symbols for electronics, foreign alphabets, etc. $19.95

Video Digitizer DS-69

This new Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69 you will be able to digitize and bring into CoCo Max a frame from any video source: VCR, tuner, or video camera. Comes complete with detailed manual and C-SEE software on disk. Multi-Pak is required.

New Low Price Save $50......... $99.95

New: faster DS-69A.......... $149.95

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The Machine Language Loader

The loader is divided into two parts. The first part encrypts the BASIC program and is located at $2500. This is done simply by finding the end address and exchanging every other byte up to it. This is very easily done and requires no code to encrypt, but it serves its purpose and disables the `LIST` command upon loading the program. This section also puts the end address of the BASIC program into the second part, a permanent part of the final product.

The section is not used until the execution of the BASIC program and is saved along with it. Its processes include de-crypting the program and setting the BASIC pointers in memory, or telling the computer exactly where the program is. It is because of these pointers that you can't just save the BASIC memory as an ML program.

Creating the Loader

The loader can be made in two ways. If you have *Disk EDTASM* or some other compatible assembler, then you can enter and assemble the assembly language listing; otherwise, simply use the BASIC program that pokes the loader directly into memory. You can save it by typing `SAVEM"LOADER", &H2500, &H25FA, &H2500` and pressing ENTER.

Using the Program

First you must load a BASIC program into memory. Make sure you have a backup of the program saved in case something goes wrong. Then you must find its end address. This can be done by typing `PRINT PEEK(27)*256+PEEK(28)`. It is these two locations (`27` and `28`) that hold the end address of the BASIC program in Hex. Using the equation given, they are modified to a decimal number equaling the end of the program. Write this number down.

Next, load in the completed ML loader already saved on disk. Then type `EXEC &H2500` and press ENTER. The first part of the loader encrypts the BASIC program and returns. Then you must save the program as a machine language file. The format for this is `SAVEM"`*filename*`"`, *start address*, *end address*, *execute address*. You must type this in as follows: `SAVEM"`*filename*`",&H25DB`, *the number obtained from our equation*, `&H25DB`. This saves the file as an ML program starting at &H25DB and ending at the end of your BASIC file with its execution at &H25DB. This is the execution location of the ML loader included in the saved file.

You're finished! You now should have a newly-created machine language program that can be loaded and executed independent of any other file. Note that this loader does not interfere with the BASIC interpreter or BASIC functions and can be overwritten after its execution. It simply allows the loading and execution of the BASIC program after which the memory it takes up is free.

Modifications and Additions

Other routines that might be of use to a BASIC programmer would be a reset and BREAK key disable. These should be put directly in the beginning of the BASIC program so as to disable these functions as soon as possible.

To disable the reset button, you should enter `POKE 113,0`. It will give you a cold start upon pressing it.

To disable the BREAK key on all but `INPUT` and `LINEINPUT` commands, you can use a routine taken, with permission, from the book *500 Pokes, Peeks 'N' Execs*. Enter the following into your BASIC program:

```
FOR I=330 TO 336:READ A:POKEI,
A:NEXTI:DATA 50,98,28,175,
126,173,165:POKE 410,126:POKE
411,1:POKE412,74
```

If you are familiar with machine language and want to modify the loader to disable any of these things, simply remember the new start and execute number for the completed ML/BASIC file, and make sure the line in the first section that puts the end location in the second section is also modified. One can do this without changing the first section or the encryption part of the loader because they are separated in memory by approximately 200 bytes (via the `ORG` statements). Therefore, one could modify the second section without changing the first.

(Questions about this program may be directed to Mr. Dahlgren at 21 Edinburg Drive, Pittsburgh, PA 15235, 412-372-5674. Please enclose an SASE for a reply when writing). ☐

Listing 1: `LOADMASK`

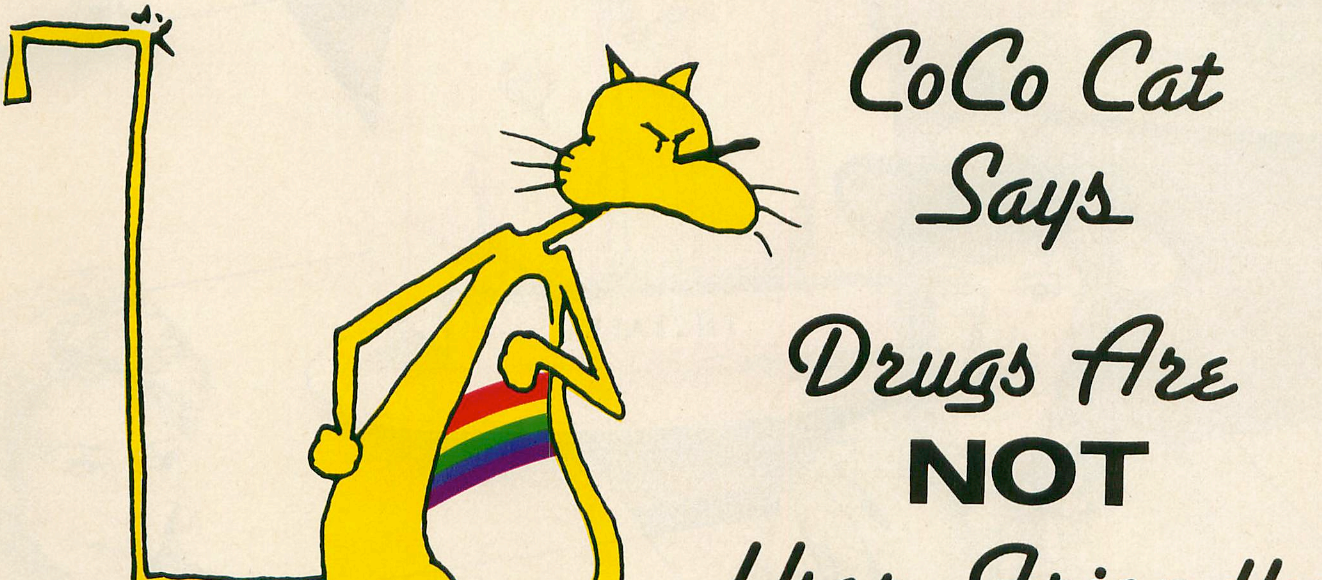
```
0 ''''''''''''''''''''''''''''''' 0
0  LOADMASK MACHINE LANGUAGE    0
0        LOADER CREATER         0
0 ............................. 0
10 FOR T=&H2500 TO &H2514:READ A
$:POKET,VAL("&H"+A$):NEXTT
20 FOR T=&H25DB TO &H25FB:READ A
$:POKET,VAL("&H"+A$):NEXTT
30 SAVEM"LOADER",&H2500,&H25FB,&
H2500
40 DATA 9E,19,10,9E,1B,10,BF,25,
FA,EC,84,1E,89,ED,81,BC,25,FA,2F
,F5,39,8E,26,01,10,BE,25,FA,EC,8
4,1E,89,ED,81,BC,25,FA,2F,F5,10,
9F,1B,10,8E,26,01,10,9F,19,7E,AD
,21,00,00
```

Listing 2: `LOADER`

```
2500                 00100         ORG     $2500
2500 9E   19         00110 NSTART  LDX     $19        START ADDRESS
2502 109E 1B         00120         LDY     $1B        END ADDRESS
2505 10BF 25FA       00130         STY     ENDAD      STORE FOR LATER
```

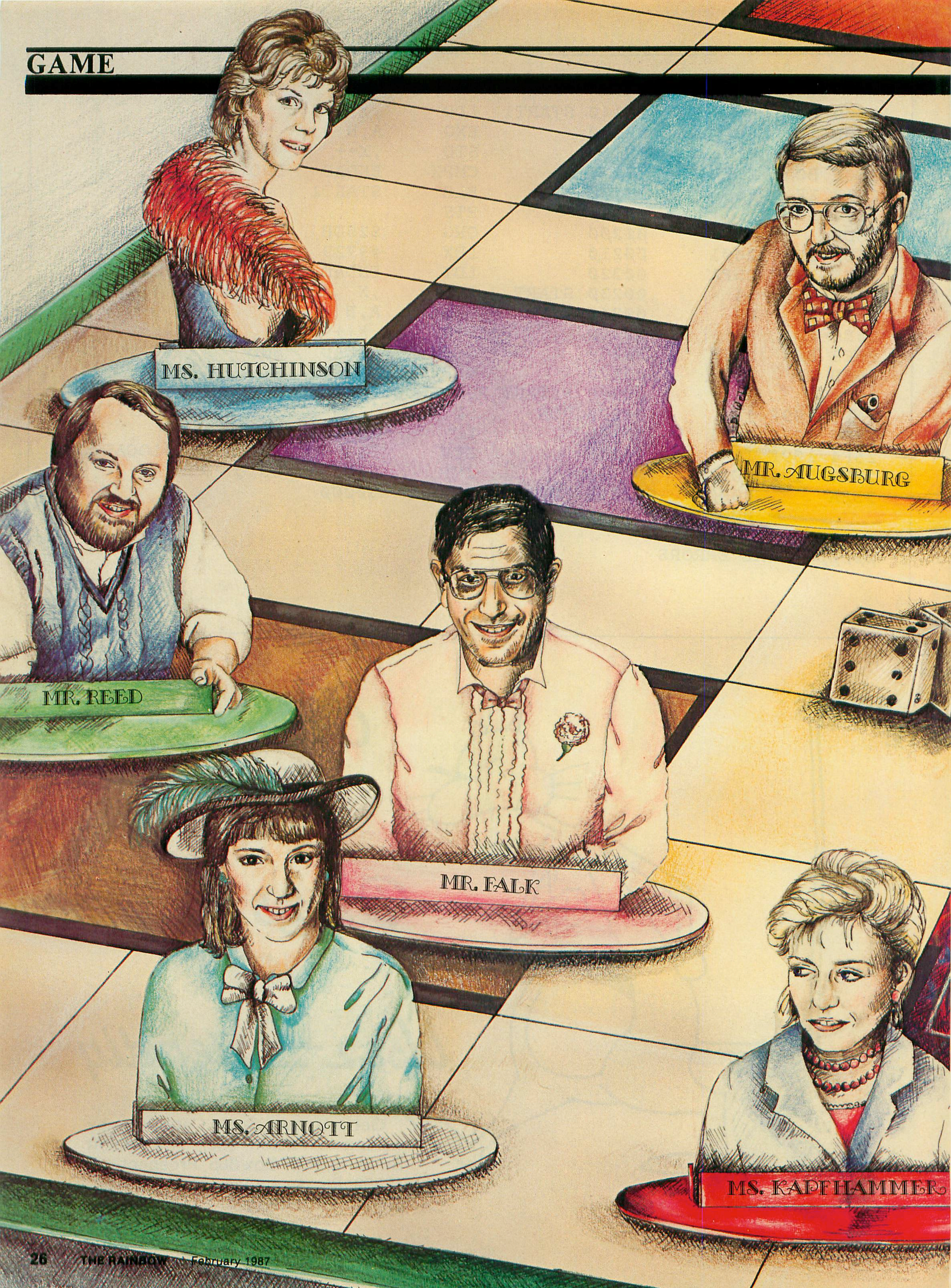
```
2509 EC     84       00140 START1  LDD      ,X
250B 1E     89       00150         EXG      A,B
250D ED     81       00160         STD      ,X++
250F BC     25FA     00170         CMPX     ENDAD    END
2512 2F     F5       00180         BLE      START1
2514 39              00190         RTS
25DB                 00200         ORG      $25DB
25DB 8E     2601     00210         LDX      #9729    START ADDRESS
25DE 10BE 25FA       00220         LDY      ENDAD    GET END LOCATION
25E2 EC     84       00230 START   LDD      ,X
25E4 1E     89       00240         EXG      A,B
25E6 ED     81       00250         STD      ,X++
25E8 BC     25FA     00260         CMPX     ENDAD    END
25EB 2F     F5       00270         BLE      START
                     00280 *START RUN PROCEEDURE
25ED 109F 1B         00290 RUN     STY      $1B      PUT END LOCATION
25F0 108E 2601       00300         LDY      #9729    GET START
25F4 109F 19         00310         STY      $19      PUT START LOCATION
25F7 7E     AD21     00320         JMP      $AD21    GOTO 'RUN'
25FA        0000     00330 ENDAD   FDB      $0000
            0000     00340         END

00000 TOTAL ERRORS
```



Get your own CoCo Cat button by writing to Falsoft, Inc., The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Please enclose $1.50 for shipping and handling.

GAME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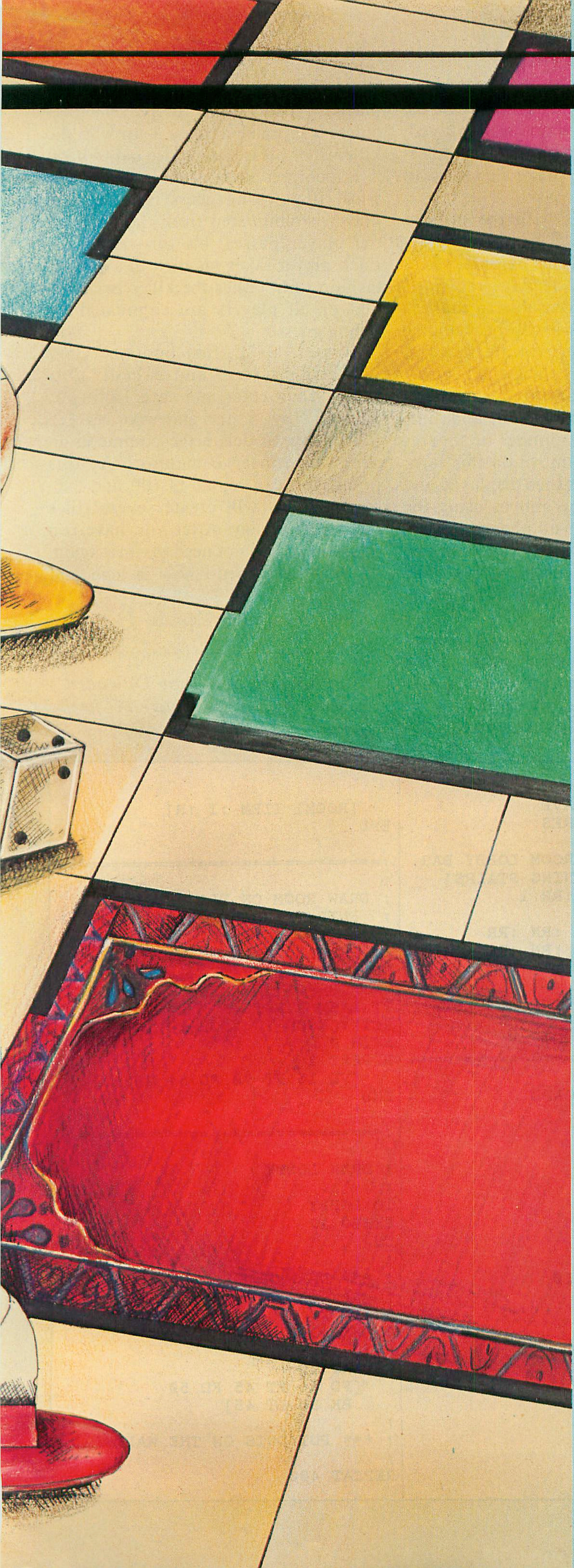
MS. KAPFHAMMER



D.L. LOGO
OS-9

RAINBOW ON DISK ONLY

One of the Rainbow staff is an imposter bent on murder and mayhem

THERE'S EVIL DOINGS AFOOT AT THE HOTEL COCO

By Dale Lear

Welcome, detectives, to the Hotel CoCo, a parlor game filled with intrigue and suspense. The Hotel CoCo has everything you would want in a fine hotel — swimming pool, four-star dining room and much more. Unfortunately, the hotel is having a slight problem. One of its distinguished guests from THE RAINBOW magazine staff is really an imposter. Who is he really? Perhaps a refugee from one of the many home computer companies that didn't have the staying power of the CoCo. Perhaps some LOGO enthusiast bitter over the fact that the new computer language that this game is written in, *D.L. LOGO*, is only available for the color computer. Who knows? Whatever the motive, this sinister culprit is determined to "off" the hotel guests one by one. Your mission as the hotel detective (or detectives, as the case may be; this game can be played by any number of players) is to determine just who the imposter is.

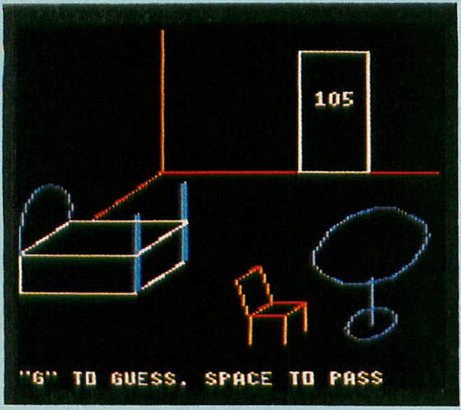
The game takes place in a hotel which contains the following rooms: Lobby, Kitchen, Dining Room, Bar, Swimming Pool, Stairs, and six hotel rooms (rooms 101 through 106).

Besides the detectives (the players), there are six guests at the hotel, one registered in each of the six hotel rooms. The guests are Ms. Kapfhammer, Ms. Arnott, Ms. Hutchinson, Mr. Falk, Mr. Reed and Mr. Augsburg. The guests move freely about the hotel with the exception that no guest has the key to any hotel room but his own. Each of the guests comes to the hotel with a valuable posession. Whenever the guests go back to their hotel rooms they may decide to leave the valuable in the room or they may decide to take it with them.

Dale Lear owns Dale Lear Software and makes his living developing programs for the Color Computer. He has authored games and other software such as Double Back, Baseball, TSEDIT, TSWORD *and* D.L. LOGO. *Dale, his wife, Laurel, and their six children live in Petaluma, California.*

One of the guests is really a killer in disguise. Whenever the killer ends up alone in a room with only one other guest and no detectives snooping about, he strikes! The victim is left at the scene of the crime and, if the victim was carrying his valuable at the time, the killer steals it and immediately stashes it away in his hotel room.

Each player is a detective. Each detective takes his turn using the arrow keys to move about the playing board according to the spin of the wheel. All the detectives have passkeys and can go freely into all rooms of the hotel including the guests' rooms. When in a room, the names of the guests currently in the room are displayed. Also, a list of the valuables in the room is displayed. Whenever a room is entered, the detective has a chance to make a guess as to who the killer is, or pass.



"G" TO GUESS. SPACE TO PASS

The game begins with the prompt "number of players:." Next, each player's name is entered one by one.

The screen then displays the hotel registration. It is advisable to make a copy of this list, as it can be valuable information in trying to locate the killer. At the press of a key the game begins.

A spinner appears giving the first player a number between one and nine. This number is the number of squares that the player can move on this turn. The playing board is then displayed and the player makes his moves using the four arrow keys. The number of squares left to be moved is displayed in the lower-right corner of the screen. The player's name is displayed in the lower-left corner.

If the player enters a room, a picture of the room appears and a list of the people and things in the room is presented. Listen carefully at this time because if a murder takes place anywhere in the hotel you will here a chord played. At this point the player either enters `G` to make a guess as to who the killer is, or presses the space bar to pass.

If a correct guess is made, the player wins. If a wrong guess is made, the player is eliminated from the game. If the player passes, his turn is ended. Each player takes his turn in a similar fashion until either the killer is identified or all players are eliminated by wrong guesses.

To run `HOTEL`, first boot the OS-9 operating system and execute *D.L. LOGO.* Then enter and save Listing 1, `SETUP`. Now, enter and save `HOTEL`. Remember to delete the comments in order to conserve memory. At this point, you can reload `SETUP` and execute it. This will create several files required for play. After you have run this, you should not need to run it again. All you have to do now is load and execute `HOTEL`.

Good luck, super sleuths! ☐

Editor's note: See Dan Downard's review of D.L. LOGO *on Page 147 in the January 1987 issue.*

Listing 1: `SETUP`

```
;=============================
;
; SET UP PROGRAM FOR HOTEL COCO
;
TO SETUP
SETSPLIT 2
SPLITSCREEN
WINDOW
HT
PD
PRINT
PRINT [- SETTING UP PICTURES]

;
; *** SAVE ROOM INFO
;
MAKE "R
  [[[ROOM 101] 0 12]
   [[ROOM 102] 0 16]
   [[ROOM 103] 6 16]
   [[ROOM 104] 12 16]
   [[ROOM 105] 18 16]
   [[ROOM 106] 18 12]
   [[LOBBY] 9 2]
   [[BAR] 18 8]
   [[POOL] 0 6]
   [[KITCHEN] 18 4]
   [[DINING] 15 6]
   [[STAIRS] 9 10]]
IF MEMBER? "ROOMS CATALOG
  [ERASEFILE "ROOMS]
OPENWRITE "ROOMS
WRITE "ROOMS :R
CLOSEWRITE "ROOMS

;
```

```
; *** DRAW AND SAVE
;     ROOM PICTURES
;
MAKE "RR [BOARD ROOM LOBBY BAR
 POOL KITCHEN DINING STAIRS]
FOR "RN 1 COUNT :RR 1
  [CS
   RUN LIST ITEM :RN :RR
   SAVEPICT ITEM :RN :RR
  ]
CS
PRINT [PICTURE SETUP COMPLETE]
END

;==============================
;
; DRAW PLAYING BOARD
;
TO BOARD
SETBG 12
CS
;
; *** DRAW GRID
;
SETPC 2
SETH 0
FOR "I -120 120 10
   [SETXY :I -75
    FD 170]
SETH 90
FOR "I -75 95 10
   [SETXY -120 :I
    FD 240]
;
; *** DRAW ROOMS
;
SETPC 1
FOR "I 1 12 1
```

```
   [ROOM1 ITEM :I :R]
END

;==============================
;
; DRAW ROOM ON PLAYING BOARD
;   ENTRY: -ROOM VARIABLE
;
TO ROOM1 :Z
SETXY -108+10*ITEM 2 :Z
       -73+10*LAST :Z
TT LAST FIRST :Z
SETXY XCOR-10 YCOR-10
SETH 0
REPEAT 2
   [FD 16 RT 90 FD 54 RT 90]
END

;==============================
;
; DRAW LOBBY
;
TO LOBBY
SETBG 12
CS
;
; *** DRAW FLOOR
;
SETPC 2
SETXY -128 -40
SETH 90
REPEAT 16
   [FD 16 RT 45 FD 50
    BK 50 LT 45]
;
; *** PUT DOTS ON THE WALL
;
REPEAT 400
```

```
[SETPC 1+RANDOM 3
 DOT 128-RANDOM 256
     96-RANDOM 136]
;
; *** DRAW DOORS
;
DOOR -40 -40 "\ CO
DOOR   0 -40 "CO
;
; *** DRAW STAR DECORATION
;
SETXY 0 48
SETPC 1
REPEAT 18
   [FD 25 BK 25 RT 20]
END

;=============================
;
; DRAW BAR
;  ENTRY:
;  EXIT:
;
TO BAR
SETBG 12
CS
;
; *** DRAW BAR
;
SETPC 2
SETH 90
FOR "I 1 8 1
   [SETX ITEM :I [-40 -40 -60
                  -60 -60 -60
                  -60 -22]
    SETY ITEM :I [-16 -6 32
                  34 36 38
                  40 60]
    FD 256]
SETXY -40 -16
SETH 0 FD 48
SETXY -60 40
SETH 60
FD 42
;
; *** DRAW FLOOR
;
SETPC 3
SETXY -40 20
SETH 270
FD 88
;
; *** DRAW DOOR
;
DOOR -120 20 "BAR
;
; *** DRAW BAR STOOLS
;
FOR "X -40 80 40
   [STOOL :X 0]
END

;=============================
;
; DRAW POOL
;  ENTRY:
;  EXIT:
;
TO POOL
SETBG 12
CS
;
; *** DRAW HORIZON
;
SETPC 3
SETXY -120 40
SETH 90
```

```
FD 240
;
; *** DRAW POOL
;
SETPC 2
SETXY -40 -40
SETH 60
FOR "X -100 20 4
   [SETXY :X -40
    FD 100]
;
; *** DRAW LADDERS
;
LADDER -95 -35
LADDER 80 -5
END

;=============================
;
; DRAW LADDER
;  ENTRY: -X COORDINATE
;         -Y COORDINATE
;
TO LADDER :X :Y
SETPC 3
SETXY :X :Y
REPEAT 2
   [SETH 0
    REPEAT 18 [FD 1 RT 10]
    SETXY XCOR-3 YCOR+5]
END

;=============================
;
; DRAW KITCHEN
;
TO KITCHEN
SETBG 15
CS
;
; *** DRAW COUNTER
;
SETH 90
SETPC 0
SETXY -128 -20
FD 256
SETXY -128 40
FD 256
;
; *** DRAW WALL
;
SETXY -128 60
REPEAT 80
    [FD 4 LT 135 FD 100
     BK 100 RT 135]
;
; *** DRAW CABINET DOORS
;
FOR "I 1 4 1
   [SETH 0
    SETY -10
    SETX ITEM :I [-120 0 40 80]
    REPEAT 4
       [FD 40 RT 90]
    SETH 60
    SETXY XCOR+5 YCOR+55
    REPEAT 2
       [FD 20 RT 30 FD 40
        RT 150]]
;
; *** DRAW BURNERS
;
FOR "I 1 4 1
   [SETXY
      ITEM :I [-57 -10 -27 -10]
      ITEM :I [47 53 47 53]
      OVAL 3]
```

```
;
; *** DRAW FLOOR
;
SETPC 1
SETH 90
FOR "Y -32 -90 -10
   [SETXY -128 :Y
    FD 256]
SETH 225
FOR "X -120 180 20
   [SETXY :X -20
    FD 100]
END

;=============================
;
; DRAW DINING ROOM
;
TO DINING
SETBG 14
CS
;
; *** DRAW WALL LINE
;
SETPC 0
SETXY -120 20
SETH 90 FD 240
;
; *** DRAW DOORS
;
DOOR -100 20 CHAR 32
DOOR -60 20 CHAR 32
;
; *** TABLES AND CHAIRS

;
SETPC 1
TABLECHAIRS -120 -50
TABLECHAIRS 0 -40
TABLECHAIRS 10 -100
END

;=============================
;
; DRAW STAIRS
;
TO STAIRS
SETBG 15
CS
SETPC 2
SETXY 80 -80
SETH 0
;
; *** FOR EACH STAIR
;
REPEAT 15
[REPEAT 10
;
; *** VERTICAL PORTION OF STAIR
;
 [RT 60 FD 50 BK 50 LT 60 FD 1]
 RT 60 FD 50 LT 150
;
; *** BACK WALL
;
 SETPC 1
 REPEAT 4
    [RT 90 FD 150 BK 150
     LT 90 FD 4]
 SETPC 2
 BK 15 RT 150 BK 50 LT 150
;
; *** FRONT OF STAIRCASE
;
 REPEAT 16
    [LT 90 FD 150 BK 150
     RT 90 FD 1]
 RT 150 FD 50 LT 60 FD 10
 BK 10 RT 60 BK 50 LT 60]
END

;==============================
;
; DRAW HOTEL ROOM
;
TO ROOM
SETBG 12
CS
;
; *** DRAW WALL LINES
;
SETPC 1
SETXY -40 20
SETH 0 FD 70 BK 70
RT 90 FD 160 BK 160
RT 150 FD 50
;
; *** DRAW BED
;
BED -25 -25
;
; *** DRAW CHAIR
;
SETPC 1
CHAIR 10 -70
;
; *** DRAW TABLE
;
SETPC 2
TABLE 50 -20
;
; *** DRAW DOOR
;
DOOR 40 20 "
END
```

```
;==============================
;
; DRAW BED
;  ENTRY: -X COORDINATE
;         -Y COORDINATE
;
TO BED :X :Y
SETPC 2
SETH 0
SETXY :X :Y
FD 40 LT 120 FD 4 LT 60 FD 40
SETPC 3
RT 60 FD 28 RT 120
SETPC 2
FD 40 LT 120 FD 4 LT 60 FD 40
SETPC 3
RT 90 FD 70 RT 90 FD 20 RT 90
FD 70 LT 30 FD 36 LT 150 FD 70
LT 30 FD 36 RT 120
SETPC 2
FOR "I 1 60 2
   [RT 7 FD 1+15/:I]
END

;==============================
;
; DRAW TABLE AND CHAIRS
;  ENTRY: -X COORDINATE
;         -Y COORDINATE
;
TO TABLECHAIRS :X :Y
CHAIR :X :Y
CHAIR :X+20 :Y+20
TABLE :X+40 :Y+50
END

;==============================
```

```
;
; DRAW CHAIR
;  ENTRY: -X COORDINATE
;         -Y COORDINATE
;
TO CHAIR :X :Y
SETXY :X :Y
SETH 0
FD 15 RT 90 FD 20 RT 90 FD 15
BK 15 LT 120 FD 15 RT 120 FD 15
BK 15 RT 90 FD 20 RT 70 FD 20
LT 100 FD 15 LT 80 FD 20 LT 100
FD 15
END

;==============================
;
; DRAW TABLE
;  ENTRY: -X COORDINATE
;         -Y COORDINATE
;
TO TABLE :X :Y
SETXY :X :Y
OVAL 14
SETXY XCOR+33 YCOR-15
SETH 180
FD 25
SETX XCOR-15
OVAL 6
END

;==============================
;
; DRAW BAR STOOL
;  ENTRY: -X COORDINATE
;         -Y COORDINATE
;
```

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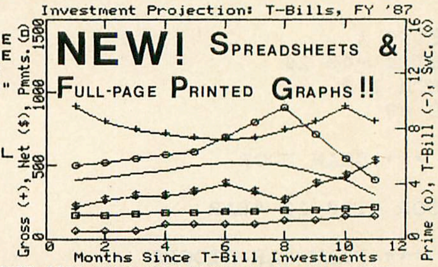

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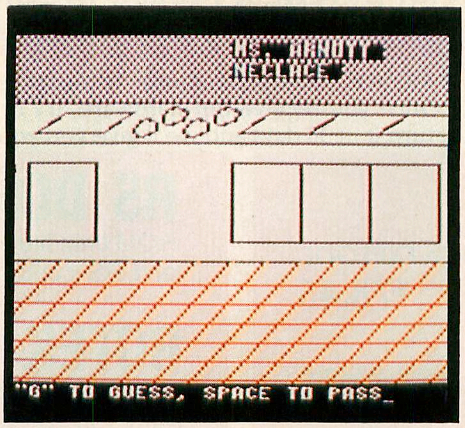
```
TO STOOL :X :Y
SETXY :X :Y
SETPC 1
OVAL 7
SETXY XCOR+15 YCOR-8
SETH 180
FD 30
END

;==============================
;
; DRAW DOOR
;  ENTRY: -X COORDINATE
;         -Y COORDINATE
;         -TEXT ON DOOR
;
TO DOOR :X :Y :N
SETPC 3
SETXY :X :Y
SETH 0
REPEAT 2
   [FD 60 RT 90 FD 40 RT 90]
SETXY :X+15 :Y+40
TT :N
END
;==============================
;
; DRAW OVAL
;  ENTRY -SIZE
;
TO OVAL :Y
SETH 40
REPEAT 2
   [REPEAT 5
       [FD :Y RT 18]
    REPEAT 5
       [FD :Y/5 RT 18]]
END
```

Listing 2: HOTEL

```
;============================
;
; *** H O T E L   C O C O ***
;
;       BY DALE LEAR
;
;============================
TO HOTEL
RANDOMIZE
TEXTSCREEN
CLEARTEXT
;
; *** GET NUMBER OF PLAYERS
;
PRINT1 "NUMBER\ OF\ PLAYERS\:
MAKE "NP FIRST RQ
;
; *** GET PLAYERS NAMES
; *** SET UP PLAYER
;        VARIABLES P1-PN
;    EACH OF THE FORM [# # # #]
;                      ^ ^ ^ ^
;        CURRENT ROOM--^ ^ ^ ^
;                        ^ ^ ^
;          X COORDINATE--^ ^ ^
;                          ^ ^
;            Y COORDINATE--^ ^
;                            ^
;              PLAYERS NAME--^
;
FOR "I 1 :NP 1
 [PRINT1 "NAME\  :I ":
  MAKE (WORD "P :I)
   (LIST 0 12 1 RQ)]
;
; *** PRINT WELCOME
;
CLEARTEXT
PRINT [**WELCOME TO THE COCO HOTEL**]
PRINT
PRINT [FIND THE KILLER!]
;
; *** ASSIGN ROOMS
;
MAKE "Z SHUFFLE [1 2 3 4 5 6]
MAKE "GST
 [[MS. KAPFHAMMER] [MS. ARNOTT]
  [MS. HUTCHINSON] [MR. FALK]
  [MR. REED] [MR. AUGSBURG]]
;
; *** PRINT REGISTRATION
;
PRINT
PRINT [--- ROOM --- GUEST ----]
FOR "I 1 6 1
[SETCURSOR LINE 8
  PRINT ITEM :I :Z
  SETCURSOR LINE-1 16
  PRINT ITEM :I :GST]
PRINT
PRINT [COPY THE REGISTRATION]
PRINT [PRESS ANY KEY]
;
; *** PLAY OPENING SONG
;
MUSIC [T240 2LCLC 2LCLCCC
2LCLCCE 2LCLCDF 2LCLCEG
2LCLCFA LCLCEG LCLCDF
2LCLCCE 2LLB'LLB'D 2LLB'LLB'DG
2LLB'LLB'DA 2LLB'LLB'DB'
8LLALLAEHC#]
;
; *** ASSIGN VALUABLES
;
MAKE "VBL SE SHUFFLE
 [[GOLD RING] [MINK COAT]
  [NECLACE]] SHUFFLE
 [[FAT WALLET] [MONEY CLIP]
  [BMW KEYS]]
;
; *** SET UP VALUABLE
;      STATUS VARIABLES V1-V6
;      EACH OF THE FORM [# #]
;                        ^ ^
;     WHO OWNS VALUABLE--^ ^
;                          ^
; 0-WITH OWNER, 1-IN ROOM--^
;
FOR "I 1 6 1
 [MAKE (WORD "V :I)
   (LIST :I 0)]
;
; *** SET UP GUEST
;      STATUS VARIABLES G1-G6
;      EACH OF THE FORM [# # #]
;                        ^ ^ ^
;        REGISTERED ROOM--^ ^ ^
;                          ^ ^
;          0-ALIVE, 1-DEAD--^ ^
;                            ^
;             CURRENT ROOM---^
;
FOR "I 1 6 1
 [MAKE (WORD "G :I)
  (LIST ITEM :I :Z 0 0)]
;
; *** READ ROOM DATA FROM DISK
;
OPENREAD "ROOMS
MAKE "R READ "ROOMS
CLOSEREAD "ROOMS
;
; *** SET UP QUICK-CHECK
;   ROOM COORDINATE LIST
;
MAKE "L []
FOR "I 1 COUNT :R 1
 [MAKE "X
  10*INT (ITEM 2 ITEM :I
  :R)/3+INT (LAST ITEM :I
  :R)/2
  MAKE "L SE :L :X :X+10]
;
; *** SELECT KILLER
;
MAKE "K 1+RANDOM 6
;
; *** SET UP VIDEO
;
MAKE "SLUFF RC
SETSPLIT 1
SPLITSCREEN
WINDOW
CS
SETBG 12
HT
MAKE "C 0
;
; *** PLAY
;
WHILE "TRUE
 [FOR "PN 1 :NP 1
;
; *** RUN "TURN"
;      FOR EACH PLAYER
;
  [MAKE "C :C+1
   MAKE "PP WORD "P :PN
   MAKE :PP TURN THING :PP]]
END

;==============================
;
; SUBROUTINE TURN
;  ENTRY: - PLAYER VARIABLE
;  EXIT:  - PLAYER VARIABLE
;
TO TURN :PR
CLEARTEXT
PRINT1 "- LAST :PR "\'S\ TURN
;
; ALLOW PLAYER TO MOVE
; ACCORDING TO SPIN
;
OUTPUT MOVE :PR SPIN
END

;==============================
;
; SUBROUTINE MOVE
;  ENTRY: - PLAYER VARIABLE
;         - NUMBER OF SQUARES
;  EXIT:  - PLAYER VARIABLE
;
TO MOVE :PL :N
;
; *** SHOW PLAYING BOARD
;
LOADPICT "BOARD
CLEARINPUT
;
```

```
; ** CAPTURE CURRENT X,Y
;
MAKE "PX ITEM 2 :PL
MAKE "PY ITEM 3 :PL
SETH 0 ST
;
; ** REPEAT FOR EACH SQUARE
;
DO
 [SETCURSOR 15 30
  PRINT1 :N
;
; ** LOCATE TURTLE ON
;    CURRENT SQUARE
;
  SETXY :PX*10-115 :PY*10-85
;
; ** GET ARROW KEY
;
  MAKE "Z ASCII RC
;
; ** CALCULATE NEW X,Y
;
  SELECT
    [:Z=9 [MAKE "PX :PX+1]
     :Z=8 [MAKE "PX :PX-1]
     :Z=12 [MAKE "PY :PY+1]
     :Z=10 [MAKE "PY :PY-1]
     "TRUE [MAKE "N :N+1]]
  SOUND 1000+RANDOM 500 20
;
; *** QUICK CHECK TO SEE IF
;      IN ROOM
;
  IF MEMBER? (WORD INT
    :PX/3 INT :PY/2) :L
;
; ***YES, DETERMINE ROOM
;     CALL "INROOM"
;     ZERO SQUARE COUNT
;
   [MAKE "W INT (WHERE+1)/2
    INROOM :W
    MAKE "N 0]
  ELSE
;
; ***NO, DECREMENT SQUARE COUNT
;     SET CURRENT ROOM=0
;
   [MAKE "N :N-1
    MAKE "W 0]
 ] WHILE :N>0
OUTPUT LIST :W :PX :PY LAST :PL
END

;==============================
;
; SUBROUTINE INROOM
;  ENTRY: CURRENT ROOM
;
TO INROOM :W
CS
PD
HT
;
; *** LOAD ROOM PICTURE
;
LOADPICT FIRST FIRST ITEM :W :R
;
; *** RUN ROOM TOUCHUP PROGRAM
;
RUN FIRST ITEM :W :R
;
; *** MOVE GUESTS/VALUABLES
;
SCRAMBLE
;
; *** ATTEMPT MURDER
;
TRYKILL
;
; *** PRINT GUESTS IN ROOM
;
FOR "I 1 6 1
 [IF :W=LAST THING WORD "G :I
  [IF 0=ITEM 2 THING WORD "G :I
    [TPRINT ITEM :I :GST]
   ELSE
    [TPRINT SE ITEM :I
     :GST "\(DEAD\)]]]
;
; *** PRINT VALUABLES IN ROOM
;
FOR "I 1 6 1
[MAKE "V THING WORD "V :I
 MAKE "G THING WORD "G FIRST :V
 IF 0=LAST :V
  [IF :W=LAST :G
   [TPRINT ITEM :I :VBL]]
 ELSE
  [IF :W=FIRST :G
   [TPRINT ITEM :I :VBL]]]
CLEARTEXT
PRINT1 "\"G\"\ TO\ GUESS,
PRINT1  \ SPACE\ TO\ PASS
CLEARINPUT
;
; *** ALLOW GUESS
;
IF RC="G [GUESS]
END

;==============================
;
; SUBROUTINE GUESS
;
TO GUESS
TEXTSCREEN
CLEARTEXT
;
; *** DISPLAY LIST OF GUESTS
;
FOR "I 1 6 1
 [PRINT " ITEM :I :GST]
PRINT
PRINT[SELECT SUSPECT,PRESS ENTER]
SETCURSOR 0 0
;
; *** ALLOW SELECT WITH CURSOR
;
DO
 [MAKE "Z ASCII RC
  SELECT
   [:Z=12 [MAKE "D -1]
    :Z=10 [MAKE "D 1]
    "TRUE [MAKE "D 0]
   ]
  IF LINE+:D>=0
   [SETCURSOR LINE+:D COLUMN]
 ] WHILE :Z<>13
;
; *** TEST FOR CORRECT ANSWER
;
IF LINE+1=:K
[SETCURSOR 10 0
 PRINT [GOOD GOING SLUETH]
 MUSIC [T400 LG C E G X E 4CEG]
 PRINT
 PRINT :C "TURNS
 TOPLEVEL]
ELSE
[SETCURSOR 10 0
 PRINT [YOU HUNG THE WRONG MAN]
 MUSIC [T800 HC B B' A A' G
  G' F 8EFG'G]
 SPLITSCREEN]
END

;==============================
;
; SUBROUTINE TPRINT
; PRINT ARGUMENT THEN POSITION
; TURTLE FOR NEXT PRINT
;  ENTRY: - THING TO PRINT
;
TO TPRINT :Z
SOUND 4000 30
TT :Z
SETY YCOR-10
END

;==============================
;
; SUBROUTINE SCRAMBLE
;    MOVE GUESTS/VALUABLES
;
TO SCRAMBLE
;
; *** RELOCATE EACH GUEST
;
FOR "I 1 6 1
 [MAKE "Z WORD "G :I
  MAKE :Z RELOC THING :Z]
;
; *** DROP/PICK EACH VALUABLE
;
FOR "I 1 6 1
 [MAKE "Z WORD "V :I
  MAKE :Z DROP THING :Z]
END

;==============================
;
; SUBROUTINE RELOC
;  RELOCATE GUEST
;  ENTRY: - GUEST VARIABLE
;  EXIT:  - GUEST VARIABLE
;
TO RELOC :G
;
; *** IF GUEST IS ALIVE,
;      ASSIGN NEW ROOM
;
IF 0=ITEM 2 :G
 [MAKE "N 6+RANDOM 7
  IF :N=6 [MAKE "N FIRST :G]
  OUTPUT LPUT :N BUTLAST :G]
ELSE
;
; *** ELSE DONT CHANGE
;
 [OUTPUT :G]
END

;==============================
;
; SUBROUTINE DROP
;  DROP/PICK UP VALUABLE
;  ENTRY: - VALUABLE VARIABLE
;  EXIT:  - VALUABLE VARIABLE
;
TO DROP :V
;
; *** IF PLAYER WHO OWNS
;      VALUABLE IS IN HIS
;      REGISTERED ROOM,
;      POSSIBLY DROP/PICK UP
;
```

```
IF (FIRST
 THING (WORD "G FIRST :V))=
 LAST THING (WORD "G FIRST :V)
  [OUTPUT LPUT RANDOM 2
   BUTLAST :V]
ELSE
;
; ELSE NO CHANGE
;
  [OUTPUT :V]
END
;===============================
;
; SUBROUTINE TRYKILL
;  ATTEMPT MURDER IF ALL
;  THE ELEMENTS ARE RIGHT
;
TO TRYKILL
;
; *** DETERMINE KILLER'S ROOM
;
MAKE "RK LAST THING WORD "G :K
;
; *** KILLER WONT STRIKE
;     IF ANY PLAYER IN THE ROOM
;
FOR "I 1 :NP 1
 [IF :RK=LAST THING WORD "P :I
   [STOP]]
;
; *** SEE IF A GUEST IS ALONE
;      WITH THE KILLER
;
MAKE "VICTOM 0
FOR "I 1 6 1
 [MAKE "Z THING WORD "G :I
;
; *** DONT COUNT KILLER
;
  IF :K<>:I
;
; *** IS GUEST IN KILLERS ROOM?
;
  [IF :RK=LAST :Z
;
; *** DON'T COUNT DEAD PEOPLE
;
   [IF 0=ITEM 2 :Z
;
; *** IS ANYONE ELSE HERE
;
    [IF :VICTOM=0
      [MAKE "VICTOM :I]
     ELSE
      [STOP]]]]]
IF :VICTOM<>0
;
; *** ALL ELEMENTS OK! STRIKE!
;
    [KILL :VICTOM]
END
;===============================
;
; SUBROUTINE KILL
;  ENTRY: - VICTOM
;
TO KILL :VICTOM
;
; PLAY DIFFERENET SONG FOR EACH
; VICTOM
MUSIC ITEM :VICTOM
 [[4LCLE'LGC ] [4LCCHC]
  [4CC#DD#] [4CE'G'A]
  [4CE#G#] [4LALBCE]]
MAKE "G WORD "G :VICTOM
;
; *** CHANGE STATUS TO DEAD
```



```
"G" TO GUESS, SPACE TO PASS_
```

```
;
MAKE :G LIST FIRST THING
  :G 1 LAST THING :G
;
; *** ASSIGN VICTOMS VALUABLES
;       TO THE KILLER
;
FOR "I 1 6 1
 [MAKE "V WORD "V :I
  IF (LIST :VICTOM 0)=THING :V
   [MAKE :V LIST :K 1]]
END
;===============================
;
; SUBROUTINE SPIN
;  EXIT:  - NUMBER OF SQUARES
;
TO SPIN
;
; *** DRAW WHEEL
;
SPLITSCREEN
CS
PD
HT
SETPC 1
SETH -90
FOR "I 1 9 1
[SETPC 3-PC
 FD 80
 PU
 LT 20 BK 40 TT :I
 FD 40 RT 20 BK 80 RT 40
 PD]
;
; *** SPIN TURTLE
;
PU
ST
SETXY -72 -4
SETH 0
REPEAT 27+5*RANDOM 10
 [SOUND 1000 10
  FD 10 RT 8]
OUTPUT 1+INT HEADING/40
END
;===============================
;
; SUBROUTINE ROOM
;  TOUCH UP ROOM PICTURE
;
TO ROOM :Z
SETXY 55 60
TT :Z
SETXY -128 90
END
;===============================
```

```
;
; SUBROUTINE LOBBY
;  TOUCH UP LOBBY PICTURE
;
TO LOBBY
SETXY -25 51
TT PIECE 10 17 DATE
SETXY -128 30
END
;===============================
;
; SUBROUTINE BAR
;  TOUCH UP BAR PICTURE
;
TO BAR
SETXY -128 10
END
;===============================
;
; SUBROUTINE POOL
;  TOUCH UP POOL PICTURE
;
TO POOL
SETXY -128 90
END
;===============================
;
; SUBROUTINE KITCHEN
;  TOUCH UP KITCHEN
;
TO KITCHEN
SETXY 0 90
END
;===============================
;
; SUBROUTINE DINING
;  TOUCH UP DINING ROOM PICTURE
;
TO DINING
SETXY 0 90
END
;===============================
;
; SUBROUTINE STAIRS
;  TOUCH UP STAIRS PICTURE
;
TO STAIRS
SETXY -128 90
END
```

MR. AUGSBURG

Most Howard Medical products are COCO 3 compatible, some require special patches. Please inquire when you order.

GUARANTEE — Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out, test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back, (less shipping).

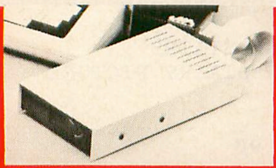
COCO MAX II
Lets the graphic capabilities of your CoCo EXPLODE on the screen or on paper. $78.45

Y CABLE
Needed to connect CoCo Max and disk drive at same time. $19.45

MAX FONTS
Three sets include 72 different fonts for typesetting bulletins, brochures and announcements $63

COLORING BOOK™
by Glenside Color Computer Club
Twenty-two pictures of clip-art add the professional look to your pamphlet, menu or catalog sheets $15
($2 shipping for each product)

DISK CONTROLLER
NEW FROM J&M
The DC-4 is a scaled down versionof the popular DC-2 without a parallel port or memory minder. It includes a switch with 2 ROM sockets, JDOS, manual and such features as gold connectors and metal box. It accesses double sided drives and accepts RSDOS 1.1 for Radio Shack compatibility.
($2 shipping) $65



TEAC DISK 55B DRIVE
The Teac 55B fits into the spare slots in the Radio Shack 501 Disk Drive. This bare drive features 40 Track, double sided 360K potential and a six millisecond track seek rate. ($2 shipping) $132

The **DD-2** combines the Teac 55B with our ½ height horizontal case and heavy duty power supply. ($2 shipping) $188

DE-1 disk enclosure ½ height horizontal with heavy duty power supply. Includes all mounting hardware. ($2 shipping) $35.00

DE-2 full height disk enclosure. Accepts two ½ height drives. Includes power supply for 2 drives and all mounting hardware. ($2 shipping) $39.50

RS DOS ROM CHIP
ROM chip fits inside disk controller. 24 pin fits both J&M and RS controller Release 1.1. For CoCo 3 Compatibility
Reg. $40 ($2 shipping) $20 each

BOTEK
Serial to parallel converter converts the CoCo 4 pin serial output to run a parallel printer like Star or Epson. Includes all cables. Add $10 for modem attachment.
($2 shipping) $68⁴⁵

WORD PACK RS
This ROM pack is the hardware answer for an 80 column display. It includes a built-in video controller to drive a monochrome monitor like our 123A. To get started, you need OS-9 2.0, a Y-cable or multipack interface drive 0, and a monochrome monitor.
($2 shipping) $89

New basic driver runs word pack without need for an OS-9. $10

TYPEWRITERS
Howard Medical has located and tested a select few typewriters that can connect to the Tandy Color Computer and we offer them here at mail order prices. These typewriters bridge the gap between dot matrix and daisy wheel printers with excellent letter quality and keyboard access. Try one in your home for 30 days and if you do not agree that this is the best of both worlds return it pre-paid for a courteous refund.

OLIVETTI CX880 with built-in parallel port $395*

OLYMPIA ORBIT XP with built-in parallel port $286*

OLYMPIA CARERRA with free $75 starter kit
Needs $75 parallel interface adapter $225*

SMITH CORONA 6100 with spell checker
Needs $98 parallel & serial interface adapter $315*

*($7 shipping)

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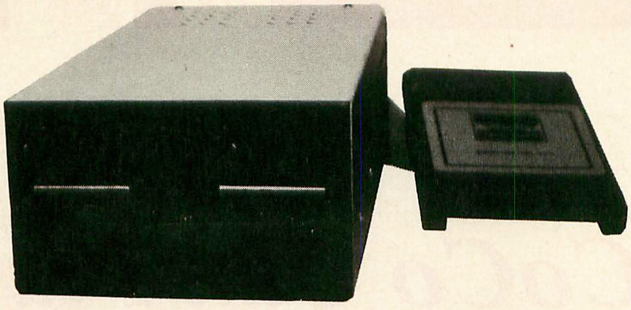
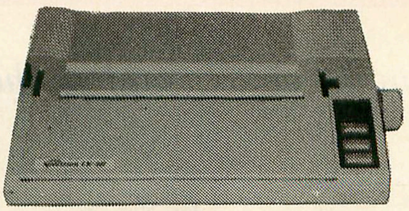


Drive 0 and 1 **269^{95}**

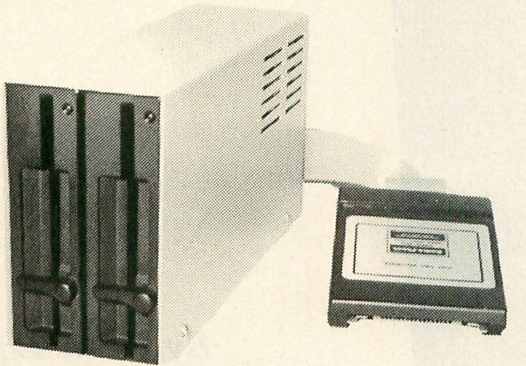
One double sided drive with doubler board and new RS controller so you can have the equivalent of 2 drives in one. You can even backup from 0 to 1. Works with all CoCo's. Compatible w/RS DOS. No special operating system needed.



EPSON® LX-80 PRINTER 239^{95}

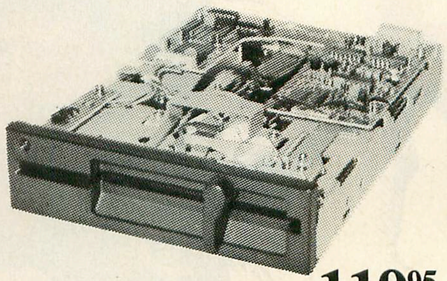
The logical choice for your CoCo! 80 column, 100 CPS in draft mode, 16 CPS in near letter quality mode, 1K Buffer, compatible with CoCo max. 1 year warranty.* LX-80 Tractor Feed 27.95. Serial to parallel converter starting at only 49.95.

*We are authorized Epson® Sales and Service



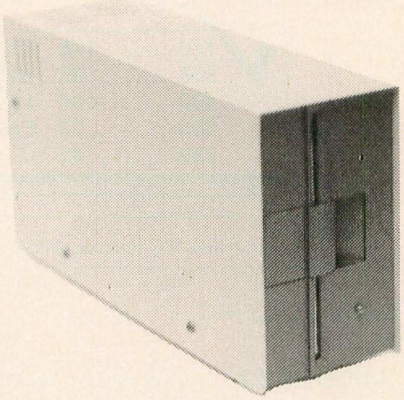
2 Drives **299^{95}**

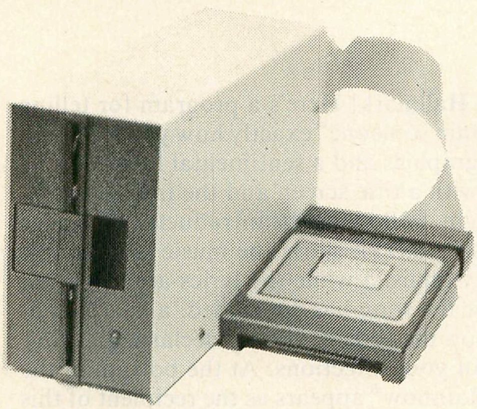
Both our drive 0 and 1 in one case, with cable and R.S. controller. The best just got better!



Drive 1 Upgrade **119^{95}**

Add a second 1/2 height drive to your Radio Shack® Thin Line Disk Drive. Comes with 3 minute installation instructions, screwdriver required. Please specify either catalog #26-3129 or 26-3131 when ordering.





Drive 1 **125^{95}**

Your Choice
Silver or White

199^{95} Drive 0

SUPER DRIVE SALE

Special prices on new first quality disk drives. They even have GOLD connectors on the back... Some other places charge 229.00 for dr. 1 and 299.00 for dr. 0, not us! Drive 1 is I, Second Color Computer drive, or external mod III, IV. Drive 1 just plugs into the extra connector on your Drive 0 cable. Both drives are compatible with any version of the Color Computer and all versions of drives. Drive 0 is your first Color Computer drive and comes complete with cable, manual, and R.S. controller. Bare full hgt SSDD drive only 79.95.

THE COMPUTER CENTER
901-761-4565, 5512 Poplar, Memphis, TN 38119

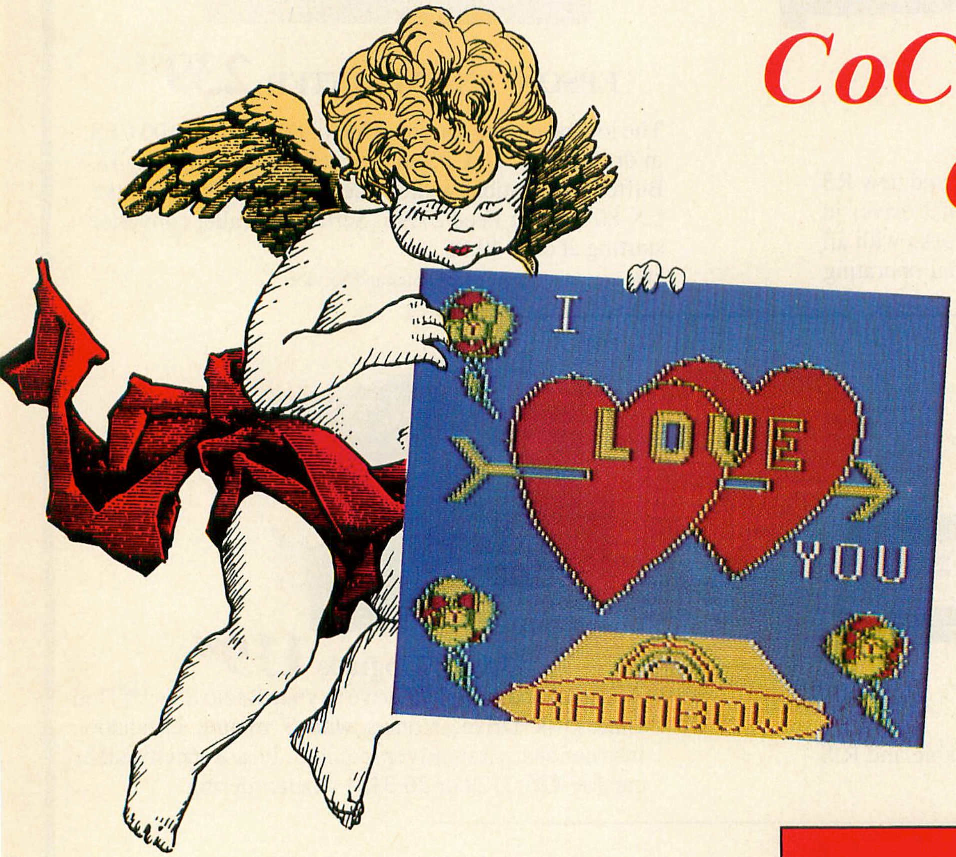
Add $4.90 for shipping and handling—Visa, MC & money orders accepted, No CODs
Allow an additional 3 weeks for personal checks—Drive faceplates may vary slightly

Prices subject to change without notice. Radio Shack is a registered trademark of Tandy Corporation

Prices subject to change without notice.

16K
ECB

Love is in the air . . . and on the screen



CoCo Can Play Cupid, Too

By Ernie DiZazzo

Move over Hallmark! Here's a program for telling that "certain someone" exactly how you feel, with colorful graphics and a sentimental love song.

Lovecard starts with a title screen and the instruction to press any key to begin. Following the introductory message and graphics, pressing ENTER starts the music (sort of like high-tech strolling violinists) while the lyrics are displayed on the screen. After the song has concluded, a hearts-and-roses finale bursts on the screen, vividly declaring, "I love you" to the object of your affections. At the bottom of the screen, the name "Rainbow" appears as the recipient of this message, but you can edit it to display a different name.

Lovecard is perfect for bestowing upon a loved one on special occasions, such as anniversaries or Valentine's Day — or just any ol' time you want someone you care about to know how you feel.

(Questions about this program may be addressed to the author at 10800 A Esplanade Avenue, Montreal, Quebec, Canada H3L 2Y6. Please enclose an SASE for a response.) ☐

Ernie DiZazzo lives in Montreal and is a veteran of World War II. Formerly a statistician with an electronics company, Ernie enjoys listening to music and sharpening his programming skills by reading THE RAINBOW.

170	176	920	215
330	96	1050	113
490	104	1160	185
650	27	END	47
780	42		

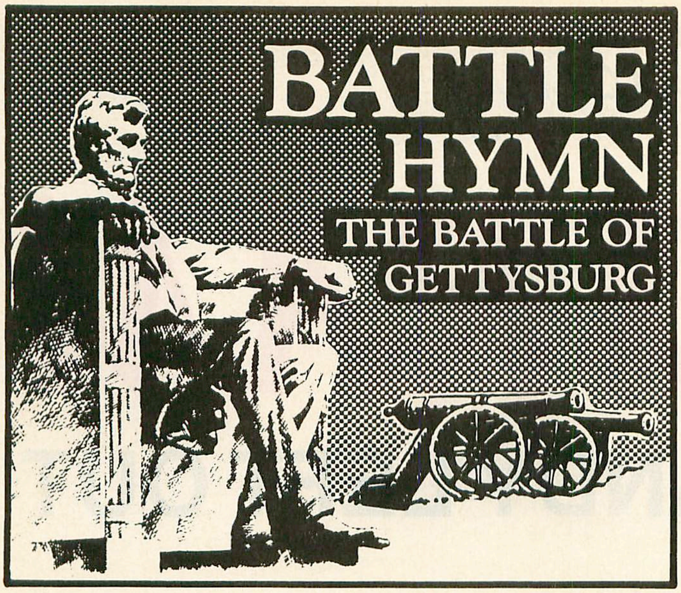
Editor's Note: This program will not work on the CoCo 3.

The listing: LOVECARD

```
0 CLS
10 PRINT@32,"-------------------
-------------
20 PRINT@70,"I  L O V E  Y O U
30 PRINT@96,"-------------------
-------------
40 PRINT@134,"BY  ERNIE. DI ZAZZ
O.
50 PRINT@197,"10800 A  ESPLANADE
 AVE.
60 PRINT@263,"MONTREAL.   H3L-2Y
6
70 PRINT@328,"QUEBEC     CANADA.
80 PRINT@390," MUSIC RE-WRITTEN
```

```
BY          M.MARANDOLA & E.DI Z
AZZO.
90 PRINT@448,"-----PRESS ANY KEY
 TO BEGIN-----
100 EXEC41172
110 CLEAR200
120 CLS:PMODE3,1:PCLS4:SCREEN1,0
130 DRAW"BM5,5;C2D28R8U28L8;BM35
,25;D28R18U6L10U22L8
140 DRAW"BM65,45;BD3D22F3R15E3U2
2H3L15G3BR5BD4D14F3R4E3U14H3L4G3
150 DRAW"BM95,65;D20F8R6E8U20L6D
18G3L4H3U18L6;BM125,85;D29R18U6L
10U6R8U6L8U6R10U6L18
160 DRAW"BM160,115;F12D16R6U16E1
2L8G6L2H6L6
170 DRAW"BM190,135;BD3D24F3R15E3
U24H3L15G3BR6BD4D16F3R3E3U16H3L3
G3
180 DRAW"BM225,155;D25F3R14E3U25
L7D20G2L3H2U20L6
190 PAINT(6,6),3,2:PAINT(38,28),
1,2:PAINT(68,48),2,2
200 PAINT(98,68),1,2:PAINT(128,8
8),3,2:PAINT(172,124),2,2
210 PAINT(193,138),1,2:PAINT(226
,158),3,2
220 EXEC41172
230 PMODE3,1:PCLS(5):SCREEN1,1
240 PAINT(0,0),4
250 FORT=30 TO -30 STEP-1
260 A=(2*3.1415)*T/60
270 LINE(128,96)-(75*SIN(A)+128,
75*COS(A)+96),PSET
280 LINE(128,96)-(75*SIN(A)+128,
75*COS(A)+96),PRESET
290 Q=60-2*T:FORY=Q TO 0 STEP-1:
NEXT
300 NEXT:CLS
310 CLS(7):PMODE4,1:PCLS:SCREEN1
,1
320 PRINT@224,"A SONG OF LOVE IS
 A SAD SONG,HI-LI-LI,HI-LI-LI,HI
-LO
330 A$="V31O2T3;L4C;L2A;L4F;C;F;
A;O3L2.D;L2C;O2L4C;C;A;C;C;A;L4B
-;O2L1G
340 PLAY A$
350 CLS(2)
360 PRINT@224,"A SONG OF LOVE IS
 A SONG OF WOE,DON'T ASK ME HOW
I KNOW
370 B$="P4;L4C;L2G;L4E;C;E;G;O3L
2D;L4C;O2L2G;L4C;O3L2C;L4C;L2C;O
2L4B-;L1A
380 PLAY B$
390 CLS(3)
400 PRINT@224,"A SONG OF LOVE IS
 A SAD SONG,FOR I HAVE LOVED AND
 IT'S SO
410 C$="P4;L4C;L2A;L4F;C;F;A;O3L
2.D;L2C;O2L4C;O3L2C;L4C;C;O2B-;A
;L1D
420 PLAY C$
430 CLS(4)
440 PRINT@224,"I SIT AT THE WIND
OW AND WATCH THE RAIN,HI-LI-LI,H
I-LI-LI,HI-LO
450 D$="P4;L4D;D;B-;D;D;B-;D;L2C
;L4A;L2F;L4C;C;G;C;C;G;C;L1A
460 PLAY D$
470 CLS(5)
480 PRINT@224,"TOMORROW I'LL PRO
BABLY LOVE AGAIN HI-LI-LI,HI-LI-
LI,HI-LO
490 E$="P4;L4D;D;B-;D;D;B-;D;L2C
;L4A;L2F;L4C;C;G;C;C;O3L2C;O2L4A
;L1.F
500 PLAY E$
510 CLS
520 CLS:PMODE3,1:PCLS3:SCREEN1,0
530 DRAW"BM0,0;C2R255D191L255U19
1;BM60,173;R10E25R75F25R10D16L14
5U16":PAINT(128,163),2,2
540 COLOR1:CIRCLE(30,25),9,,.80
550 CIRCLE(38,22),12,,.90,.55,1.
26
560 CIRCLE(28,18),15,,.75,.42,1.
15
570 CIRCLE(20,23),10,,.90,.12,.9
3
580 CIRCLE(28,28),13,,.85,.85,1.
65
590 CIRCLE(36,28),12,,.90,.95,1.
35
600 CIRCLE(23,50),18,,.99,.85,1
610 CIRCLE(55,48),18,,.99,.35,.4
9
620 CIRCLE(25,50),12,,.99,.85,1.
08:CIRCLE(38,45),12,,.99,.25,.60
630 CIRCLE(128,70),30,,.99,.60,.
99
640 CIRCLE(80,70),30,,.99,.51,.9
1
650 CIRCLE(140,60),30,,.99,.58,.
92
660 CIRCLE(188,60),30,,.99,.60,.
99
670 CIRCLE(65,43),99,,.99,.06,.1
5
680 CIRCLE(125,30),99,,.99,.06,.
15
690 CIRCLE(140,55),90,,.99,.38,.
48
700 DRAW"BM78,115;C1D1F2D1R1F2D1
R1F2D1R1F2D1R1F2D1R1F2D1R1F2D1R1
F2D1;BM140,100;D1F2D1R1F2D1R1F2D
1R1F2D1R1F2D1R1F2D1R2F2D1R2E2U1R
```

```
2E2U1R2E2U1R1E2U1R2E2U1R1E2U1R1E
2U1
710 DRAW"BM102,137;E2U1R2E2U1R2E
2U1R1E2U1R1E2U1R1E2U1R1E2U1R1
720 CIRCLE(227,148),9,,.80
730 CIRCLE(233,147),12,,.90,.55,
1.26
740 CIRCLE(224,143),15,,.75,.42,
1.15
750 CIRCLE(215,148),10,,.90,.12,
.93
760 CIRCLE(223,153),13,,.85,.85,
1.65
770 CIRCLE(231,153),12,,.90,.95,
1.35
780 CIRCLE(218,175),18,,.99,.85,
1
790 CIRCLE(250,173),18,,.99,.35,
.49
800 CIRCLE(220,175),12,,.99,.85,
1.08:CIRCLE(235,170),12,,.99,.25
,.60
810 CIRCLE(30,145),9,,.80
820 CIRCLE(38,142),12,,.90,.55,1
.26
830 CIRCLE(28,138),15,,.75,.42,1
.15
840 CIRCLE(20,143),10,,.90,.12,.
93
850 CIRCLE(28,150),13,,.85,.85,1
.65
860 CIRCLE(36,148),12,,.90,.95,1
.35
870 CIRCLE(23,171),18,,.99,.85,1
880 CIRCLE(55,170),18,,.99,.35,.
49
890 CIRCLE(25,171),12,,.99,.85,1
.08:CIRCLE(38,166),12,,.99,.25,.
60
900 DRAW"BM70,10;C2R8L4D14L4R8
910 PAINT(32,28),2,1:PAINT(35,20
),2,1:PAINT(40,23),2,1
920 PAINT(225,147),2,1:PAINT(35,
30),4,1:PAINT(15,24),2,1:PAINT(4
4,30),4,1
930 PAINT(28,17),4,1:PAINT(25,20
),4,1:PAINT(21,25),2,1
940 PAINT(240,143),4,1:PAINT(230
,138),4,1:PAINT(233,160),4,1
950 PAINT(230,155),2,1:PAINT(215
,151),4,1:PAINT(210,150),2,1
960 PAINT(218,145),4,1:PAINT(230
,145),2,1:PAINT(231,140),2,1
970 PAINT(28,135),2,1:PAINT(30,1
47),2,1:PAINT(25,140),4,1
980 PAINT(30,152),2,1:PAINT(35,1
35),4,1:PAINT(22,148),4,1
990 PAINT(45,144),2,1:PAINT(38,1
55),4,1
1000 A$="C4NH2NE2D2":DRAW"BM30,2
5"+A$:DRAW"BM30,145"+A$:DRAW"BM2
26,148"+A$
1010 PAINT(128,85),4,1:PAINT(170
,85),2,1
1020 PAINT(33,50),2,1:PAINT(33,1
70),2,1:PAINT(228,174),2,1
1030 DRAW"BM95,55;C1D20R14U4L9U1
6L4":DRAW"BM120,55;BD3D14F3R10E3
U14H3L10G3BR4BD3D8F2R4E2U8H2L4G2
1040 DRAW"BM147,55;D14F6R6E6U14L
5D13G2L3H2U13L4
1050 DRAW"BM174,55;NR14D20R14U4L
10U4R6U4L6U4R10U4
1060 DRAW"BM30,70;C1F10R50BR65C1
R20BR33R17H10R6F12G12L6E10L20BL3
0NU4L20BL65NU4L48G12L6E13H13R6
1070 PAINT(38,82),2,1:PAINT(80,8
2),3,1:PAINT(160,82),3,1:PAINT(2
10,82),2,1
1080 PAINT(98,70),2,1:PAINT(128,
70),3,1:PAINT(130,58),2,1
1090 PAINT(160,70),4,1:PAINT(150
,70),2,1:PAINT(177,74),4,1
1100 DRAW"BM190,105;C2D4F4ND6E4U
4BR10BD2D10F2R6E2U10H2L6G2BR20BU
2D12F2R6E2U12
1110 COLOR1:CIRCLE(133,173),28,,
.95,.56,.96:COLOR4:CIRCLE(133,16
9),22,,.90,.54,.97
1120 COLOR1:CIRCLE(133,170),18,,
.95,.56,.96
1130 COLOR3:CIRCLE(133,168),12,,
.95,.56,.96
1140 COLOR4:CIRCLE(131,181),80,,
.18
1150 DRAW"BM72,175;ND12R3BR3R3F2
D2G2NL8F2D4
1160 DRAW"BM90,177;D10U6NR10U4E2
R2BR4R2F2D10
1170 DRAW"BM108,175;R8L4D12L4R8
1180 DRAW"BM122,175;BD12U10E2R6F
2D10
1190 DRAW"BM139,175;D12R3BR4R3E2
U2H2L3BL4L3BR9E2U2H2L3BL4L2
1200 DRAW"BM157,175;BD2D8F2R2BR3
R2E2U8H2L2BL3L2G2
1210 DRAW"BM175,175;D9F3R1E2NU3F
2R2E3U9
1220 PAINT(128,172),1,4
1230 PSET(128,85,4):PSET(170,85,
2):PSET(128,175,1)
1240 PAINT(128,85),2,1:PAINT(170
,85),4,1:PAINT(128,172),2,4
1250 PRESET(128,85):PRESET(170,8
5):PRESET(128,175)
1260 PSET(128,85,4):PSET(170,85,
2)
1270 GOTO1010:GOTO1220
```



64K Disk or Tape BATTLE HYMN — The Battle of Gettysburg

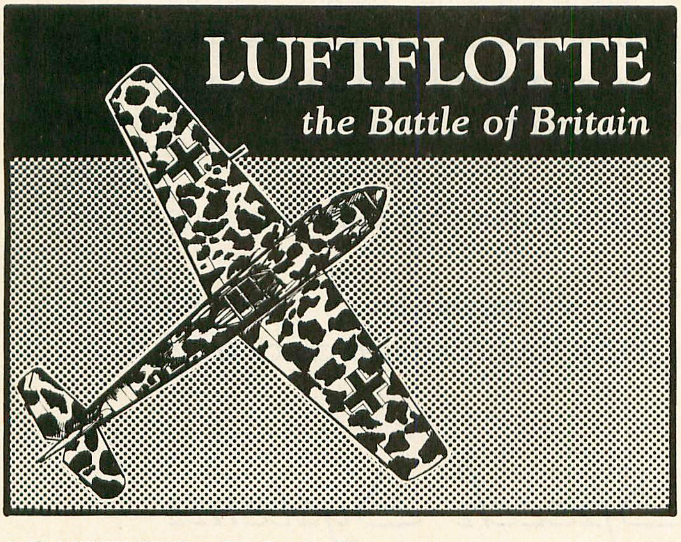
Player controls Lee's army of 11 divisions (39 individual) brigades including 3 cavalry (Stuart) and 3 artillery (Alexander) and must capture 5 victory objectives to win decisively. It's all here, from Culp's Hill to Little Round Top, from Pickett's charge to Hood's heroic victory at Devil's Den.

Play starts on the second day of the battle with Johnson, Early and Rodes facing an unreinforced Union line running from Culp's Hill down to Cemetery Hill and east. Player has early size advantage but must act quickly as Union reinforcements are seen arriving; and must form the line and charge up hill over a great distance. Where is Stuart?

Brigades must be turned to march or fire. Union troops must reload after firing.

Player may limber or unlimber cannon; must watch his fatigue factors and prevent troops from routing. The object is to force the flank and pin the enemy in a cross fire. Easier said then done. Very historic, with an Ark Royal touch.

Hi res graphics; machine language. Game save. Play takes 3-5 hours. **$29.00**



32K LUFTFLOTTE — The Battle of Britain

Player takes the German side and tries to succeed where Goering and the entire Luftwaffe failed: destroy Britain's will to fight from the air.

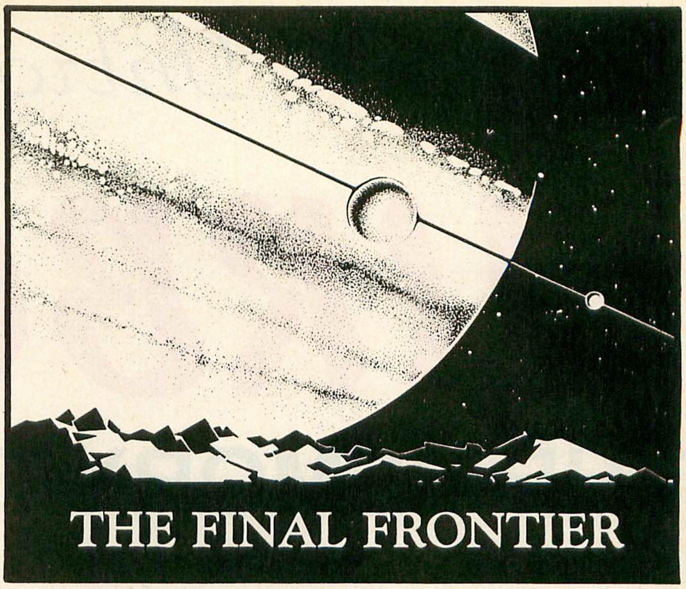
A mammoth game, Luftflotte has it all. Twenty-four British cities producing one of six war materials: petroleum, armaments, aircraft, shipping, morale, electronics; 26 air bases, 18 low radar sites, 17 high radar sites all forming a complex web of intercommunication and defense. Can you break the web?

Player controls 3 Luftflottes of over 2000 individual planes including Stuka, Junkers, Dornier and Heinkel bombers; Me110 and Me109 fighters. Player may launch bomb runs, recon missions, strafing sorties or transfers: up to five flights per Luftflotte.

Player watches as his flights head for London or Bath or Glasgow or lorad site 'j' or . . . It's up to you. There are 85 individual targets in the game.

Hi res screen shows aerial combat, bombing and strafing missions and supplies brief information. Watch targets and planes explode! Semigraphic strategic map of England and targets. For conclusive information, view the intelligence screen to see everything. Unless, of course, you prefer playing EXPERT in which case you'll be flying blind as the real Germans did not so long ago.

Playing time: 3-6 hours. Game save. Machine language. **$29.00**



32K Disk Only THE FINAL FRONTIER

You have been chosen as commander in a struggle to gain control of an unexplored section of the galaxy. Your foe: an alien race called VOLSUNG. Here in the distant future, when space travel has become commonplace, on uncharted star systems you hope to find the raw materials which are vital to your industry and construction of a fleet of space craft.

Starting with limited ships and resources, you must quickly search, locate and bring needed systems under your influence, before the aliens can gain a foothold and threaten your expansion.

A star system can support industry, mining, energy or farming. You must decide on how to concentrate your efforts to maintain a balance to best serve your needs for developing your civilization and producing new space craft. Spacecraft that you will surely need when you and the alien VOLSUNGS eventually collide in a titanic struggle for the cointrol of the Final Frontier.

100% hi res, total machine language, disk based. **$25.00**

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Isn't it time for a newsletter/magazine that talks about the games you've been playing? An in-depth resource of playing hints, strategies and tactics? Wouldn't it be nice to whip the computer?

The *Keyboard General* is published bi-monthly. We'll publish your letters; your game plays, your thoughts and ideas. You'll hear from us, our program authors. You'll learn gaming, playing and programming hints, and perhaps discover new ways to assault that village or attack that flank.

Every month we'll feature a Company Commander replay; discussion of new and old products, and letters from you. There will be special discounts and promotions offered only subscribers of the *Keyboard General*.

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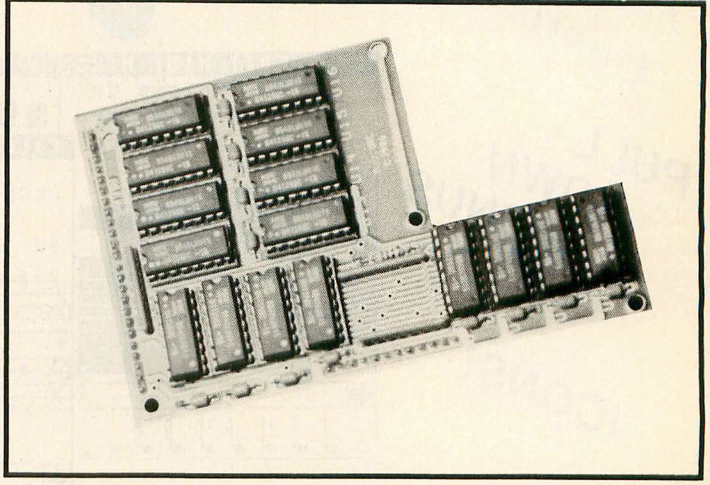

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If you know how to hold a screwdriver, we're convinced you can install Turbo Ram in minutes. However, if you like, send us your COCO 3 insured, postage paid, and we will install it, pay the return postage and guarantee it for 1 year. **$15.00**

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This is the same Junior you've seen in the Kong arcade series, but with new COCO 3 graphics. This tireless little monkey must overcome all sorts of obstacles (4 screens worth) to rescue his father, The King, from the mean zookeeper. He will traverse the jungle and swamp, climb vines, avoid chompers and birds, open locks, and more before he finally meets with his big daddy. The 16 color, 320 x 192 graphics are superb.

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CoCo 3 Compatible

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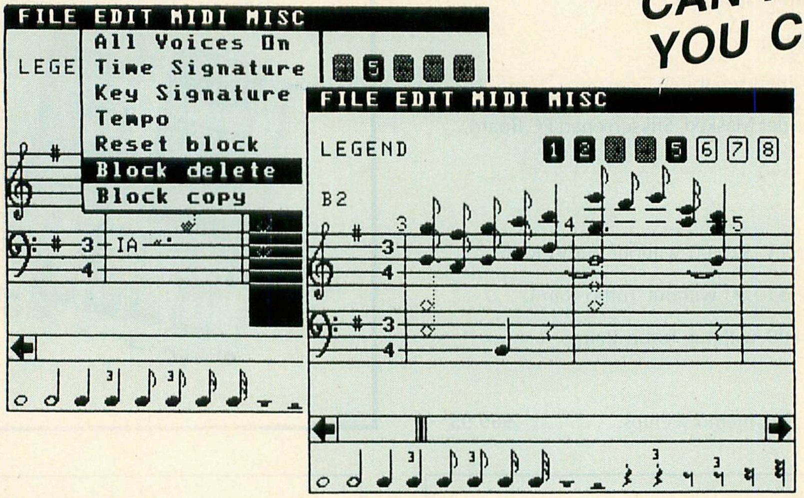
A MUST FOR MIDI USERS



LYRA is the most powerful music composition program we have seen on any computer. We don't mean just the COCO, we really mean any computer. Whether you are a novice trying to learn music or a professional musician with MIDI equipment you will find LYRA a powerful tool. You see, we wrote LYRA for musicians that hate computers. If you want proof, purchase a LYRA demo for $7.95. We will apply the demo price to your purchase. MIDI output requires the LYRA MIDI cable (#MC158) or COCO MIDI Seq/Editor (#CM147).

- Ultra Easy to use, just point with joystick or mouse and click.
- Compose with up to 8 completely independent voices.
- Room for over 18,000 notes. (This is not a misprint!)
- Super Simple Editing Supports:
  - Note insert
  - Note delete
  - Note change
  - Block insert
  - Block delete
  - Block copy
- Output music to:
  - TV Speaker
  - STEREO PAK
  - SYMPHONY 12
  - MIDI Synth
  - Monitor Speaker
  - ORCHESTRA 90
  - COCO MIDI S/E
  - MIDI Drum Machine
- Output up to 4 voices without additional hardware.
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- Output any voice on any of the 8 MIDI channels.
- Transpose music to any key.
- Modify music to any tempo.
- Automatically inserts bar for each measure as you compose.
- Key signature lets you specify sharps and flats only once, LYRA will do the rest.
- Plays MUSICA 2 files using LYRA CONVERT (#LC164).
- Each voice may be visually highlighted or erased.
- Each measure is numbered for easy reading.
- Solo capability
- Block edits are highlighted.
- Tie notes together for musical continuity.
- Name of note pointed to is constantly displayed.
- Jump to any point in the score instantaneously.
- Memory remaining clearly displayed, however you will have plenty of memory even for the most demanding piece.
- Help menu makes manual virtually unnecessary.
- LYRA is 100% software, no need for extra hardware unless you want more power.
- Music easily saved to tape or disk.
- Requires 64K and mouse or joystick.

LYRA (Disk only) #LY122 . . . . **$54.95**

LYRA OPTIONS

These LYRA options are **not** required. They are provided for those wishing additional flexibility.

LYRA CONVERT

A program to convert MUSICA 2 files to LYRA files.
(T or D) #LC164 . . . . **$14.95**

LYRA STEREO ENHANCER

Gives the LYRA stereo output when used with the STEREO PAK or ORCHESTRA 90.
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LYRA MIDI CABLE

A cable to connect your computer to your MIDI synthesizer.
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LYRA SYMPHONY 12 ENHANCER

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STEREO PAK

Plugs into the COCO ROM cartridge slot allowing easy connection to your stereo system.
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COCO MID Seq/Editor

A professional quality MIDI interface for MIDI synthesizers.
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MUSIC LIBRARY

A collection of over 800 songs. When used with CONVERT, it gives an incredible LYRA library. Each volume 100 songs.
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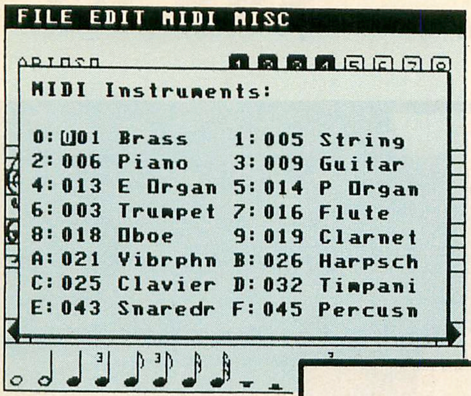


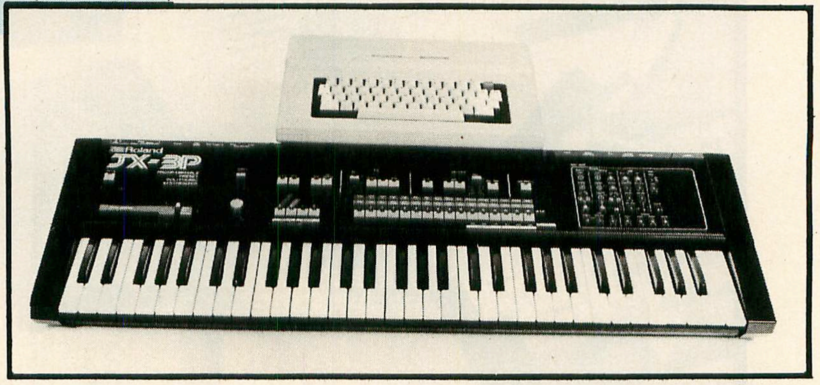
```
MIDI Instruments:

0:001 Brass     1:005 String
2:006 Piano     3:009 Guitar
4:013 E Organ   5:014 P Organ
6:003 Trumpet   7:016 Flute
8:018 Oboe      9:019 Clarnet
A:021 Vibrphn   B:026 Harpsch
C:025 Clavier   D:032 Timpani
E:043 Snaredr   F:045 Percusn
```

Introducing

CoCo 3 Compatible

COCO MIDI 2



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- ✓ Over 45 Kbytes available (Over 15,500 MIDI events possible).
- ✓ Record to any track.
- ✓ Low Level track editing.
- ✓ LYRA editing. (one voice per track).
- ✓ Playback from any number of tracks.
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- ✓ Filter out MIDI data:
  - Key pressure
  - Program change
  - Pitch wheel
  - Control Change
  - Channel Pressure
  - System Message
- ✓ Graphic Piano Keyboard Display in both record and playback mode.
- ✓ Adjustable Key (Transposition).
- ✓ Save recording to disk for later playback or editing.
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- ✓ 100% machine code.
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- ✓ Metronome
- ✓ Many songs included.

Includes MIDI hardware interface, 2 MIDI cables, detailed manual, and software. Requires 64K CoCo, Y-Cable or Multi-Pak.

COCO MIDI 2 (disk only) #CM147 . **$149.95**
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TRIPLE Y-CABLE #TY173 . . . . **$34.95**

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DX LIBRARIAN (Disk only) #DX143 . . . . $39.95

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MUSICA MIDI™

MUSICA MIDI takes any MUSICA 2 music file and plays it through your MIDI synthesizer. We offer you over 800 tunes from our MUSIC LIBRARY series (sold separately) or create your own music using MUSICA 2. Inlcudes: documentation, plenty of music, and the cable to connect between the COCO and your synthesizer.

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If you own the Casio CZ-101 or similar MIDI synth, you know that the mini keys and the short 3 or 4 octave keyboard is limiting. MIDI KEYBOARD when used with our full size 5 octave keyboard gives you the flexibility you need. Comes with cable to connect the COCO to your MIDI synth.

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CoCo 3 Compatible

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SUPER VOICE is no ordinary speech synthesizer. It uses Silicon Systems, Inc. SSI-263, the most advanced speech/sound chip available. SUPER VOICE is not only capable of highly intelligible speech, sound effects, and singing over a 6 octave range, but now we have turned SUPER VOICE into a monophonic Super Music Synthesizer with our PIANO KEYBOARD.

IT TALKS. A free TRANSLATOR text-to-speech program makes writing your own talking program as easy as SAYING "HELLO."

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FREE "REACTION" To Test Your Reflexes

FREE SUPER VOICE SINGS THE STAR SPANGLED BANNER

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Here are the facts; the decision is yours.

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Synthesizer Device	SSI-263	SC-01	SP-256	SC-01
Speaking Speeds	16	1	1	1
Volume Levels	16	1	1	1
Articulation Rates	8	1	1	1
Vocal Tract Filter Settings	255	1	1	1
Basic unit of Speech	64 phonemes 4 durations each	64 phonemes	64 allophones 5 pause lengths	64 phonemes
Pitch Variations	4096 (32 absolute levels with 8 inflection speeds)	4	1	4

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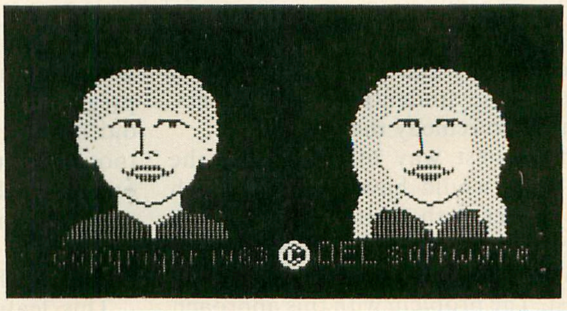
Paul and Pauline, our talking heads program is normally $24.95. Until Dec. 15 we will include them with each SUPER VOICE order.



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EDUCATION NOTES

16K
ECB

Presidents Take Precedence

By Steve Blyn
Rainbow Contributing Editor

This month, for a change of pace, we are presenting a Social Studies program to help students become more familiar with our U.S. presidents. Our main problem in developing this program was how to present the material. This was more an educational problem than one of programming.

We found that many junior high school and even some high school students who field-tested our ideas were totally unfamiliar with close to a dozen of our presidents. Some of our less popular presidents had completely eluded these students' school careers. We hope to remedy that deficit.

The easiest way of presenting the presidents would have been to match their names with their order of presidency, for example, "James Monroe-5, Zachary Taylor-12," and so on through the list. The problem with this approach is that only a person with both an excellent memory and an extreme interest in the topic could possibly succeed in such a program. We met no such interested individual.

We decided, therefore, on the approach of asking which president came before the one in the question. We give a president's name and his years of presidency. The student is then asked to choose which of three other presidents immediately preceded the one in question.

The three choices are randomly selected. We could have modified the program to select three other presidents who were in a close time-frame to the president in question, but we purposely did not do this. We felt this would be too difficult. Being randomly chosen, one of the three usually turns out to be obviously incorrect. For example, Reagan would be a silly choice for the president who preceded Truman.

This feature serves to give an alert student an edge in figuring out the correct answer. He can reduce the possibilities often to two and sometimes even to one. This process of elimination helps reinforce the student's knowledge of the presidents. On the other hand, the student who is really lost in this game will not be able to benefit by even two obviously incorrect choices.

The programming of this game is quite straightforward. There have been 40 presidents, and this is reflected in the `DIMENSION` statement in Line 40. Lines 50-70 read all of the presidents' names and years in office. These are contained in the `DATA` lines beginning with Line 390.

Lines 120-220 select and print out the question and the three choices. Variable `X` keeps track of the correct answer. Lines 230-250 prevent any duplication of names. Line 290 asks for the student's answer, which becomes variable `A`. Lines 310-320 check and print out the correct answer. Line 330 prints out the current scoreboard. Line 340 prints out the final score. Line 350 asks if you would like to go again. If the ENTER key is pressed, the game begins again. If the E key is pressed, the game is ended.

We hope that those of you who use this program in a classroom as well as those who use it at home will enjoy playing this game. While we do not really expect or even hope that anyone will memorize all of the presidential information, we do expect that each will learn more factual information on his own level about some of our presidents. As always, I enjoy hearing from readers about my articles and programs. ☐

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

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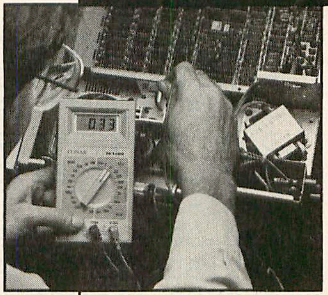

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The listing: PRESDNTS

```
10 REM"PRESIDENTIAL QUIZ"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1987"
30 Q=RND(-TIMER)
40 DIM A$(40),B$(40)
50 FOR T=1 TO 40
60 READ A$(T),B$(T)
70 NEXT T
80 G$=STRING$(32,255)
90 CLS5
100 PRINT@32,"    CORRECT =";CR"
   WRONG =";WR
110 R=RND(38)+1
120 PRINT@6," presidential quiz
";
130 PRINT@96,"   WHICH PRESIDENT
 CAME BEFORE "
140 PRINT@160,G$;:PRINT@352,G$;
150 PRINT@128,A$(R);" ";B$(R)
160 X=RND(3)
170 P=RND(40)
180 PRINT@194," 1. ";:IF X=1 THE
N PRINT A$(R-1) ELSE PRINTA$(P)
190 P1=RND(40)
200 PRINT@258," 2. ";:IF X=2 THE
N PRINTA$(R-1) ELSE PRINT A$(P1)
210 P2=RND(40)
220 PRINT@322," 3. ";:IF X=3 THE
N PRINTA$(R-1) ELSE PRINTA$(P2)
230 IF P=R THEN 110
240 IF P1=P OR P1=R THEN 110
250 IF P2=P1 OR P2=P OR P2=R THE
N 110
260 PRINT@222,CHR$(207)+CHR$(207
);
270 PRINT@286,CHR$(207)+CHR$(207
);
280 PRINT@350,CHR$(207)+CHR$(207
);
290 PRINT@384,"";:LINEINPUT"ENTE
R A NUMBER...";AA$
300 A=VAL(AA$)
310 IF A=X THEN PRINT@404,"CORRE
CT":CR=CR+1:PLAY"L50CDEFGGGGGEC"
320 IF A<>X THEN PRINT@404,"SORR
Y,";X:SOUND 100,2:SOUND 100,2:WR
=WR+1
330 PRINT@32,"    CORRECT =";CR"
   WRONG =";WR;
340 IF CR+WR=20 THEN PLAY"O3L200
BAGBAGGGGABGFEDC":PRINT@455,"fin
al score="CR*5;"%";:CR=0:WR=0
350 PRINT@484,"press ENTER to co
ntinue";
360 EN$=INKEY$
370 IF EN$=CHR$(13) THEN 90 ELSE
 IF EN$="E" THEN END ELSE 360
380 END
390 DATA GEORGE WASHINGTON,1789-
1797,JOHN ADAMS,1797-1801,THOMAS
 JEFFERSON,1801-1809,JAMES MADIS
ON,1809-1817,JAMES MONROE,1817-1
825,JOHN QUINCY ADAMS,1825-1829
400 DATA ANDREW JACKSON,1829-183
7,MARTIN VAN BUREN,1837-1841,WIL
LIAM H. HARRISON,1841-1841,JOHN
TYLER,1841-1845,JAMES POLK,1845-
1849,ZACHARY TAYLOR,1849-1850,MI
LLARD FILLMORE,1850-1853,FRANKLI
N PIERCE,1853-1857,JAMES BUCHANA
N,1857-1861
410 DATA ABRAHAM LINCOLN,1861-18
65,ANDREW JOHNSON,1865-1869,ULYS
SES S. GRANT,1869-1877,RUTHERFOR
D B. HAYES,1877-1881,JAMES GARFI
ELD,1881-1881,CHESTER A. ARTHUR,
1881-1885
420 DATA GROVER CLEVELAND,1885-1
889,BENJAMIN HARRISON,1889-1893,
GROVER CLEVELAND,1893-1897,WILLI
AM MCKINLEY,1897-1901,THEODORE R
OOSEVELT,1901-1909,WILLIAM H. TA
FT,1909-1913,WOODROW WILSON,1913
-1921
430 DATA WARREN G. HARDING,1921-
1923,CALVIN COOLIDGE,1923-1929,H
ERBERT C. HOOVER,1929-1933,FRANK
LIN D. ROOSEVELT,1933-1945,HARRY
 S. TRUMAN,1945-1953,DWIGHT D. E
ISENHOWER,1953-1961
440 DATAJOHN F. KENNEDY,1961-196
3,LYNDON B. JOHNSON,1963-1969,RI
CHARD NIXON,1969-1974,GERALD FOR
D,1974-1977,JIMMY CARTER,1977-19
81,RONALD REAGAN,1981-PRESENT
```

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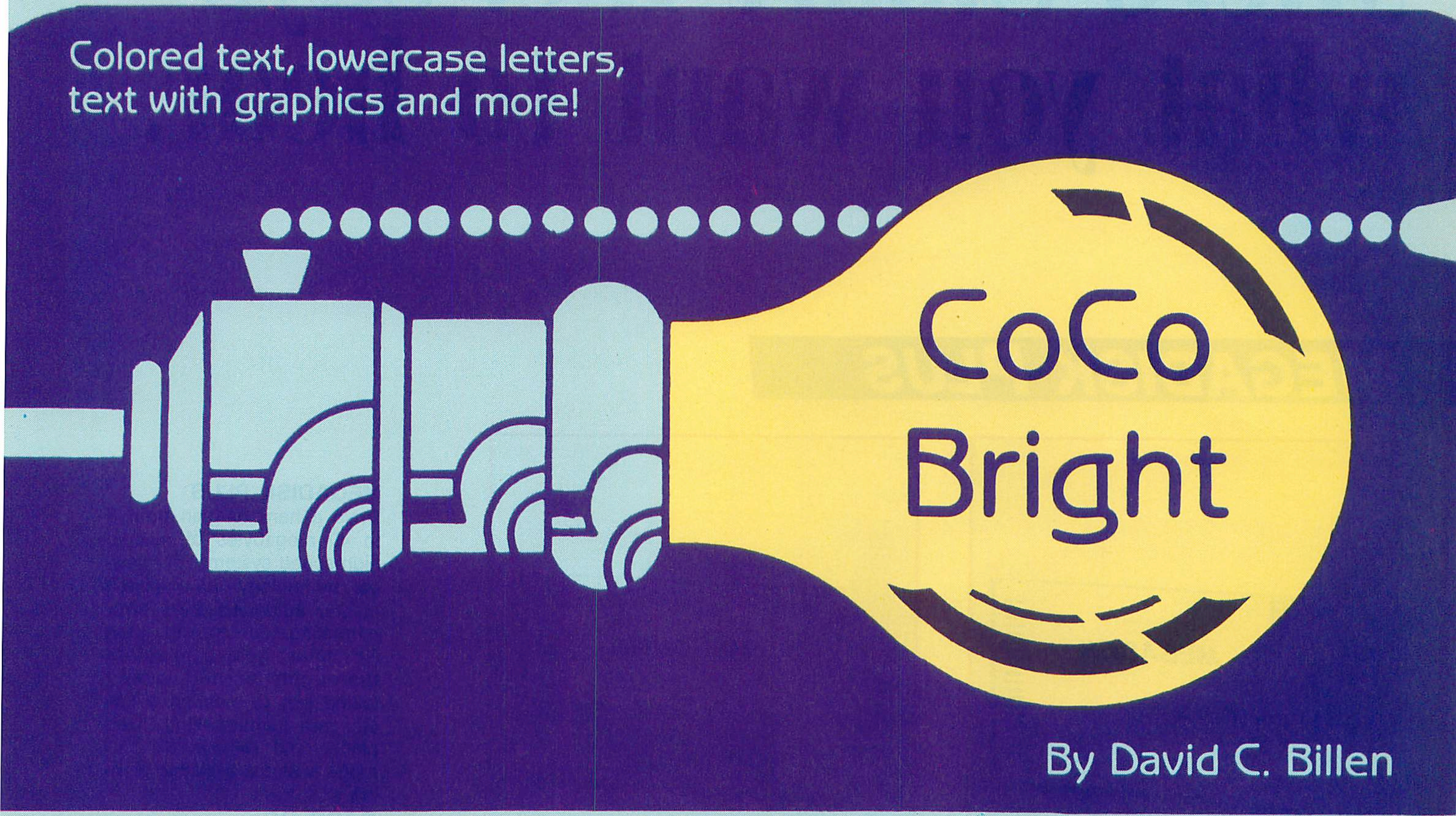

CoCo Bright

Colored text, lowercase letters, text with graphics and more!

By David C. Billen

Color Text is a machine language utility that gives your CoCo something it really needs: a better text display. More specifically, *Color Text* gives colored text, text with graphics, redefinable characters and lowercase characters. It requires Extended Color, Disk BASIC. It runs on a 16K machine, but can take advantage of 32K and even 64K.

To get *Color Text* up and running, enter Listing 1, which contains the character set. This program creates a file called CHARS.

Next, you need to enter and run Listing 2. Don't worry about merging CHARS and COLRTEXT, since *Progload* combines them for you.

Now you have a file called COLRTEXT, which is the program.

To execute COLRTEXT you should use the loader included in Listing 3. If you do not want to use the loader, COLRTEXT can be executed on a 16K system by entering:

```
CLEAR200,&H34FF:LOADM"COLRTEX
T":EXEC
```

or on a 32K system with the line:

```
CLEAR200,&H74FF:LOADM"COLRTEX
T",&H4000:EXEC
```

The loader is self-explanatory and accommodates loading COLRTEXT into the upper RAM bank on a 64K system. The program is position independent, meaning it can be loaded anywhere in memory.

Color Text is actually so compatible with BASIC that there is not much to explain. The text is on the PMODE 4,1 graphics screen to begin with. The text automatically adjusts itself to all graphics commands, including COLOR, SCREEN and PMODE.

Since, in the Hi-Res modes, *Color Text* uses a 32-by-24 screen, the PRINT@ function's range has been expanded to accommodate this. CLS has also been modified to work with *Color Text*.

You can no longer type CLS followed by a number representing the color you want the screen to clear to, but you can type CLS followed by the ASCII code of a character you want the screen cleared with. So, for example, CLS42 would fill the screen with asterisks and home the cursor.

There are also several control characters that affect the display.

A list of control characters follows:

Character		**Function**
4	—	Toggles scroll lock. (Scroll lock keeps the screen from scrolling up when a character is printed at the bottom.)
6	—	Inverts the character at the current cursor location, without updating the position of the cursor.
11	—	Inverts the screen.
12	—	Clears the screen.
27	—	Terminates *Color Text*.

Of course, the standard characters 8 and 13 do their thing too.

There really is not much more to say! Utilizing the full versatility of *Color Text* requires an understanding of Extended Color BASIC's graphics com-

---

David Billen lives in Nashville, Tenn. and is a system software designer for Gibson Guitar Corporation.

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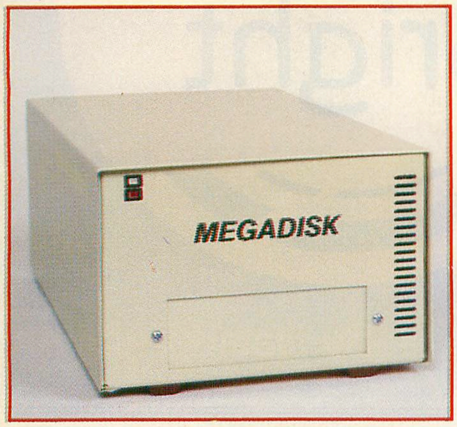

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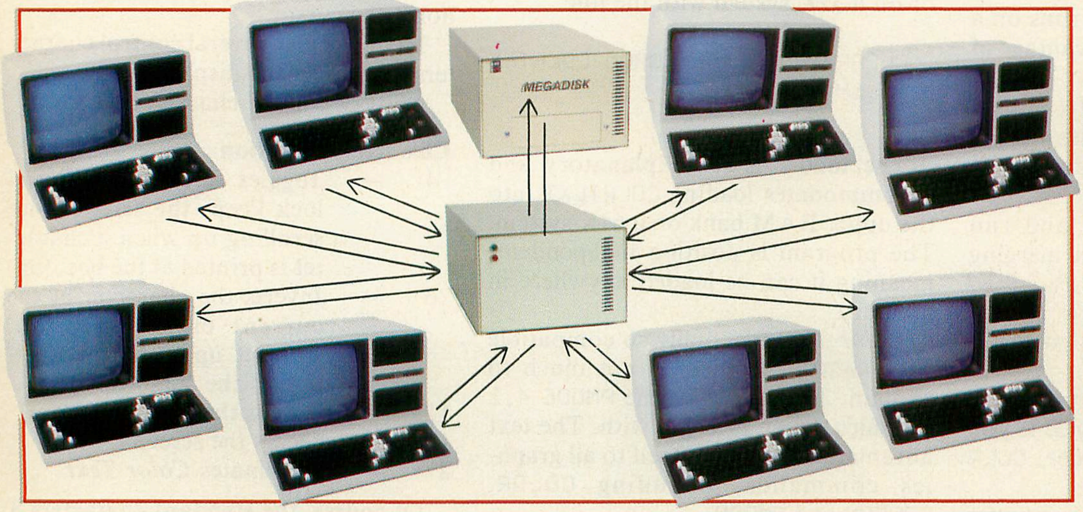

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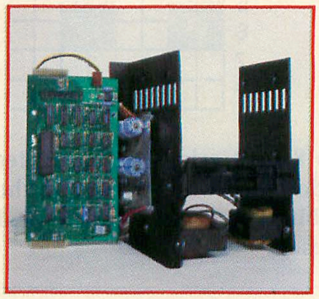

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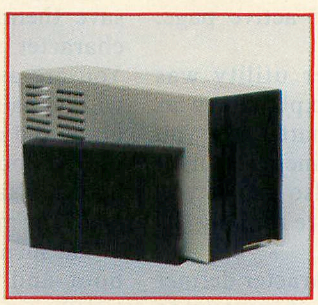

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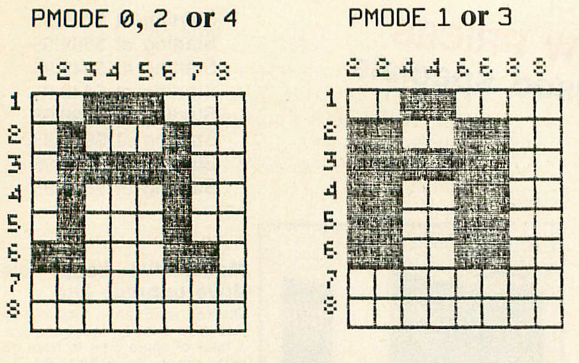
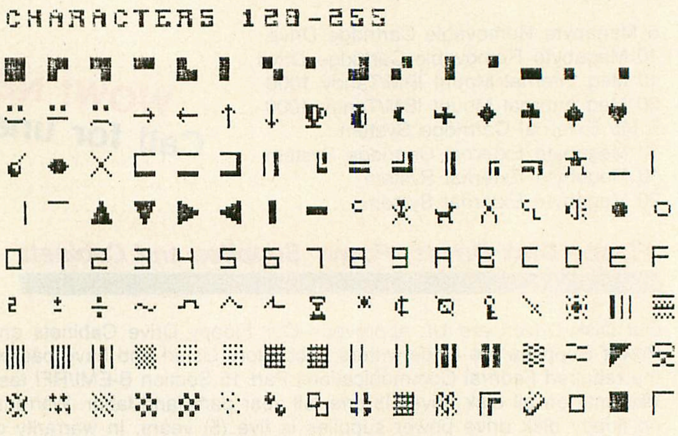
Figure 1



The letter 'A' in its 8-by-8 grid. The character appears just as it was designed when printed in the two-color modes. But bits 2, 4, 6 and 8 are doubled in the four-color modes.

Figure 2



(Most of these are not legible in the four-color modes.)

mands. *Color Text* automatically adjusts to the current and active page, mode, screen, color, etc.

The character definer utility was designed to be as self-explanatory as possible. Notice that no matter how you boot *Color Text*, the definer reboots it in the 16K mode. This also means you don't need to boot it before running the definer.

The purpose of the character definer is to create and modify characters to your own likes/needs. The menu has an option to save them and an option to save as loader. As a rule, when you are working on a character set, you should save them. Then, to actually use the character set, select "save as loader." You are asked for the name. This file will actually be *Color Text*, both program and character set. If you want to use the boot program to load it, you will have to save it with the name `COLR TEXT`, or modify the boot program.

The menu also has an option to warm boot and cold boot. Warm booting simply terminates *Color Text*. A cold boot leaves your computer in the state it's in when you first turn it on.

If you select Design, you will first select the character to be modified. When selected, its image is brought up on a big `PMODE0,1` screen. To alter it, move the blinking cursor with the arrow keys. Press the space bar to toggle the color of a block. Press ENTER when finished, or CLEAR to abort.

Here comes the trickiest thing there is to know about *Color Text*. When it prints the characters in a four-color mode, it only looks at (from left to right) the second, fourth, sixth and eighth bits. In a two-color mode it uses all of them. Your character set must be designed accordingly. ☐

180	251	820	23
270	83	930	114
380	115	1040	149
480	182	1140	138
580	14	END	126
700	253		

Listing 1: CHARLOAD

```
10 PMODE0,1:PCLEAR1:CLEAR50,&H38
7F:X=&H3880
20 READA:IFA<>999THENPOKEX,A:X=X
+1:GOTO20ELSESAVEM"CHARS",&H3880
,&H3FFF,&H3500
100 DATA 255,255,255,255,255,255
,255,255,207,207,207,207,255,207
,255,255
110 DATA 179,179,179,255,255,255
,255,255,183,183,1,183,1,183,183
,255
120 DATA 239,131,175,131,235,131
,239,255,187,187,243,239,239,155
,187,255
130 DATA 239,131,175,135,175,131
,239,255,207,63,255,255,255,255,
255,255
140 DATA 243,239,239,239,239,243
,255,255,159,239,239,239,239,159
,255,255
150 DATA 255,147,239,131,239,147
,255,255,255,239,239,131,239,239
,255,255
160 DATA 255,255,255,255,207,143
,63,255,255,255,255,131,255,255,
255,255
170 DATA 255,255,255,255,255,207
,255,255,243,243,231,159,63,63,2
55,255
180 DATA 199,179,179,179,179,199
,255,255,207,143,207,207,207,135
,255,255
190 DATA 131,243,131,191,179,131
,255,255,131,243,227,243,179,131
,255,255
200 DATA 179,179,131,243,243,243
,255,255,131,191,143,243,179,131
,255,255
210 DATA 131,191,131,179,179,131
,255,255,131,179,243,231,231,231
,255,255
220 DATA 131,179,131,179,179,131
,255,255,131,179,131,243,179,131
,255,255
230 DATA 207,207,255,207,207,255
,255,255,207,207,255,239,207,191
,255,255
240 DATA 243,231,31,207,231,243,
255,255,255,131,255,131,255,255,
255,255
250 DATA 159,207,241,231,207,159
,255,255,131,179,243,239,239,255
,239,255
260 DATA 131,187,179,191,179,131
,255,255,207,179,131,179,179,179
,255,255
270 DATA 7,179,135,179,179,7,255
,255,199,179,191,191,179,199,255
,255
280 DATA 7,179,179,179,179,7,255
,255,3,191,143,191,179,3,255,255
290 DATA 3,191,143,191,191,31,25
5,255,131,179,191,179,187,131,25
5,255
300 DATA 179,179,131,179,179,179
,255,255,199,239,239,239,239,199
,255,255
310 DATA 131,243,243,51,179,195,
255,255,51,179,143,179,179,51,25
5,255
320 DATA 63,191,191,191,179,3,25
5,255,179,147,171,187,179,179,25
5,255
330 DATA 7,179,179,179,179,179,2
55,255,131,179,179,179,179,131,2
55,255
340 DATA 3,179,131,191,191,31,25
5,255,131,179,179,179,135,251,25
5,255
350 DATA 3,179,135,179,179,51,25
5,255,131,191,131,251,147,131,25
5,255
360 DATA 3,207,207,207,207,207,2
55,255,179,179,179,179,179,207,2
55,255
370 DATA 179,179,179,179,199,239
,255,255,179,179,179,147,171,187
,255,255
380 DATA 179,147,239,239,147,179
,255,255,179,179,199,239,239,239
,255,255
390 DATA 131,243,207,191,179,131
,255,255,131,191,191,191,191,131
,255,255
400 DATA 191,191,159,231,251,251
,251,255,131,251,251,251,251,131
,255,255
410 DATA 239,199,171,239,239,239
,239,239,255,223,191,1,191,223,2
55,255
420 DATA 223,239,255,255,255,255
,255,255,255,131,243,131,179,131
,255,255
430 DATA 63,191,191,131,179,131,
255,255,255,131,179,191,179,131,
```

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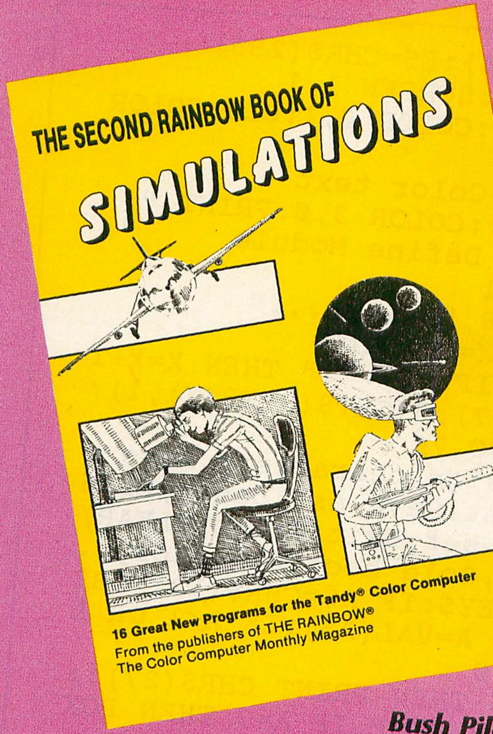
```
255,255
440 DATA 241,243,243,131,179,129
,255,255,255,131,179,131,191,131
,255,255
450 DATA 15,191,143,191,191,191,
127,255,255,131,179,131,243,243,
131,255
460 DATA 63,191,191,131,179,179,
255,255,207,255,207,207,207,207,
255,255
470 DATA 243,255,227,243,243,51,
3,255,63,191,179,143,179,179,255
,255
480 DATA 207,239,239,239,239,199
,255,255,255,147,171,171,187,179
,255,255
490 DATA 255,7,179,179,179,179,2
55,255,255,131,179,179,179,131,2
55,255
500 DATA 255,3,179,131,191,191,1
91,255,255,129,177,131,243,243,2
43,255
510 DATA 255,3,187,191,191,191,2
55,255,255,131,191,131,251,131,2
55,255
520 DATA 239,239,131,239,239,239
,255,255,255,179,179,179,179,131
,255,255
530 DATA 255,179,179,179,199,239
,255,255,255,179,179,187,171,147
,255,255
540 DATA 255,179,179,199,179,179
,255,255,255,179,179,131,243,243
,131,255
550 DATA 255,131,243,231,207,131
,255,255,231,207,207,207,191,207
,207,207
560 DATA 239,239,239,255,239,239
,239,255,63,159,159,159,239,159,
159,159
570 DATA 191,87,239,255,255,255,
255,255,255,255,255,255,255,255,
255,255
580 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,15,15,15,15
590 DATA 0,0,0,0,240,240,240,240
,0,0,0,0,255,255,255,255
600 DATA 15,15,15,15,0,0,0,0,15,
15,15,15,15,15,15,15
610 DATA 15,15,15,15,240,240,240
,240,15,15,15,15,255,255,255,255
620 DATA 240,240,240,240,0,0,0,0
,240,240,240,240,15,15,15,15
630 DATA 240,240,240,240,240,240
,240,240,240,240,240,240,255,255
,255,255
640 DATA 255,255,255,255,0,0,0,0
,255,255,255,255,15,15,15,15
650 DATA 255,255,255,255,240,240
,240,240,255,255,255,255,255,255
,255,255
660 DATA 153,153,255,255,126,129
,255,255,153,153,255,255,0,255,2
55,255
670 DATA 153,153,255,255,255,129
,126,255,255,251,253,0,253,251,2
55,255
680 DATA 255,223,191,0,191,223,2
55,255,239,199,171,239,239,239,2
39,239
690 DATA 239,239,239,239,239,171
,199,239,7,17,18,18,17,135,207,3
700 DATA 195,231,195,133,133,133
,133,195,255,199,143,143,143,199
,255,255
710 DATA 255,231,103,1,0,231,231
,255,239,199,131,1,131,199,239,2
55
720 DATA 199,199,1,1,1,239,239,2
39,239,199,131,1,1,131,239,239
730 DATA 187,1,1,1,131,199,239,2
55,255,255,255,255,255,255,255,2
55
740 DATA 254,253,251,199,155,139
,131,199,255,255,195,129,0,129,1
95,255
750 DATA 126,189,219,231,231,219
,189,126,0,127,127,127,127,127,0
,0
760 DATA 0,255,255,255,255,255,0
,0,0,252,252,252,252,252,0,0
770 DATA 115,115,115,115,115,115
,115,115,244,244,244,244,247,240
,240,255
780 DATA 255,255,255,0,255,0,0,2
55,244,244,244,4,252,0,0,255
790 DATA 244,244,244,244,244,244
,244,244,255,255,255,240,247,244
,244,244
800 DATA 255,255,255,0,252,4,4,2
44,231,231,0,195,195,189,189,60
810 DATA 255,255,255,255,255,255
,255,0,127,127,127,127,127,127,1
27,127
820 DATA 254,254,254,254,254,254
,254,254,0,255,255,255,255,255,2
55,255
830 DATA 231,231,195,195,129,129
,0,0,0,0,129,129,195,195,231,231
840 DATA 63,15,3,0,0,3,15,63,252
,240,192,0,0,192,240,252
850 DATA 199,199,199,199,199,199
,199,199,255,255,0,0,0,255,255,2
55
860 DATA 199,191,191,199,255,255
,255,255,199,199,109,171,199,199
```

```
,187,125
870 DATA 255,251,248,121,3,131,1
87,153,219,219,231,231,219,189,1
89,189
880 DATA 159,127,127,151,247,247
,241,255,230,213,55,52,55,213,23
0,255
890 DATA 255,195,129,129,129,195
,255,255,255,195,189,189,189,195
,255,255
900 DATA 3,123,123,123,123,123,3
,255,251,251,251,251,251,251,251
,255
910 DATA 3,251,251,3,127,127,3,2
55,3,251,251,3,251,251,3,255
920 DATA 123,123,123,3,251,251,2
51,255,3,127,127,3,251,251,3,255
930 DATA 3,127,127,3,123,123,3,2
55,3,251,251,251,251,251,251,255
940 DATA 3,123,123,3,123,123,3,2
55,3,123,123,3,251,251,3,255
950 DATA 3,123,123,3,123,123,123
,255,3,123,123,7,123,123,3,255
960 DATA 3,127,127,127,127,127,3
,255,7,123,123,123,123,123,7,255
970 DATA 3,127,127,3,127,127,3,2
55,3,127,127,3,127,127,127,255
980 DATA 143,239,143,191,143,255
,255,255,239,199,239,255,199,255
,255,255
990 DATA 207,207,255,3,255,207,2
07,255,255,255,159,102,249,255,2
55,255
1000 DATA 255,193,221,28,255,255
,255,255,239,215,187,124,255,255
,255,255
1010 DATA 239,207,175,96,255,255
,255,255,129,189,195,231,231,219
,129,129
1020 DATA 234,241,241,234,255,25
5,255,255,239,195,175,175,175,19
5,239,255
1030 DATA 127,131,157,173,181,19
5,253,255,231,219,219,231,231,22
7,231,225
1040 DATA 127,191,223,235,247,23
5,253,255,102,189,231,66,66,231,
189,102
1050 DATA 54,54,54,54,54,54,54,5
4,0,255,85,170,0,255,85,170
1060 DATA 85,85,85,85,85,85,85,8
5,170,170,170,170,170,170,170,17
0
1070 DATA 102,102,102,102,102,10
2,102,102,85,170,85,170,85,170,8
5,170
1080 DATA 85,255,85,255,85,255,8
5,255,170,255,170,255,170,255,17
0,255
1090 DATA 85,0,85,0,85,0,85,0,17
0,0,170,0,170,0,170,0
1100 DATA 119,119,119,119,119,11
9,119,119,187,187,187,187,187,18
7,187,187
1110 DATA 68,68,68,68,68,68,68,6
8,136,136,136,136,136,136,136,13
6
1120 DATA 51,204,51,204,51,204,5
1,204,15,240,255,255,15,240,255,
255
1130 DATA 0,1,3,7,15,31,63,127,1
29,126,126,129,24,231,231,24
1140 DATA 203,102,60,153,217,189
,102,203,187,17,187,255,238,68,2
38,255
1150 DATA 109,182,219,109,182,21
9,109,182,51,51,204,204,51,51,20
4,204
1160 DATA 204,204,51,51,204,204,
51,51,119,255,221,255,119,255,22
1,255
1170 DATA 159,47,15,159,249,242,
240,249,7,119,119,96,6,238,238,2
24
1180 DATA 217,217,217,24,255,24,
24,217,170,0,170,0,170,0,170,0
1190 DATA 153,85,102,85,153,85,1
02,85,0,127,96,96,103,103,103,10
3
1200 DATA 219,245,110,220,185,11
5,39,143,255,129,189,189,189,189
,129,255
1210 DATA 1,1,1,1,1,1,1,255,0,12
7,127,127,127,127,127,127,999
```

```
180 .......46
310 ......112
410 .......19
530 ......238
END .....107
```

Listing 2: PROGLOAD

```
10 PMODE0,1:PCLEAR1:CLEAR50,&H34
FF:X=&H3500
20 READA:IFA<>999THENPOKEX,A:X=X
+1:GOTO20
30 LINEINPUT "PREPARE TO LOAD CH
ARS, THEN     PRESS ENTER";A$
40 LOADM "CHARS":LINEINPUT "PREP
ARE TO SAVE";A$
50 SAVEM "COLRTEXT",&H3500,&H3FF
F,&H3500
100 DATA 32,7,56,128,0,0,0,0,0,1
90,1,104,175,141,0,158
110 DATA 190,1,107,175,141,1,178
,134,126,183,1,103,183,1,106,48
120 DATA 141,0,134,191,1,104,48,
141,1,154,191,1,107,190,1,161
130 DATA 48,4,175,141,2,113,183,
1,160,48,141,2,96,191,1,161
140 DATA 48,141,2,128,191,1,143,
183,1,142,111,140,186,111,140,18
4
150 DATA 142,255,192,111,132,111
,3,111,5,111,7,111,9,111,11,134
160 DATA 248,183,255,34,15,178,1
34,3,151,179,134,4,151,182,158,1
86
170 DATA 48,137,24,0,159,183,134
,32,151,185,48,141,3,2,175,140
180 DATA 129,48,141,0,10,166,128
,39,31,173,159,160,2,32,246,32
190 DATA 12,82,65,73,78,66,79,87
,39,115,32,67,111,108,111,114
200 DATA 32,84,101,120,116,13,13
,0,57,13,111,39,3,126,255,255
210 DATA 50,98,52,118,129,32,37,
36,128,32,198,8,61,227,141,255
220 DATA 65,31,2,150,178,198,85,
61,215,181,150,179,198,85,61,231
230 DATA 141,255,52,141,40,141,1
3,23,0,166,53,246,51,141,1,23
240 DATA 141,8,32,246,51,141,0,1
1,150,182,52,64,72,236,198,227
250 DATA 225,31,5,0,52,0,67,0,52
,0,67,0,116,150,185,129
260 DATA 16,39,10,220,136,196,22
4,141,14,196,31,58,57,220,136,19
6
270 DATA 240,141,4,196,15,58,57,
131,4,0,88,73,88,73,88,73
280 DATA 211,186,31,1,214,137,57
,198,8,166,160,152,181,167,132,4
8
290 DATA 136,16,90,38,244,57,198
,8,231,141,254,202,166,160,67,13
2
300 DATA 85,167,141,254,191,72,1
70,141,254,186,31,137,148,181,16
7,141
310 DATA 254,178,83,228,141,254,
176,234,141,254,169,231,132,48,1
36,32
320 DATA 106,141,254,162,38,214,
57,198,8,166,160,152,181,167,132
,48
330 DATA 136,32,90,38,244,57,4,1
92,5,128,5,128,7,0,7,0
340 DATA 158,136,48,1,159,136,51
,140,237,150,182,72,172,198,37,2
29
350 DATA 236,198,208,185,130,0,2
21,136,109,141,254,108,38,215,15
8,186
360 DATA 150,185,198,8,61,49,139
,236,161,237,129,16,156,183,37,2
47
370 DATA 32,7,142,4,0,159,136,15
8,186,166,141,254,74,167,128,156
380 DATA 183,37,250,57,13,111,39
,3,126,255,255,15,112,50,98,52
390 DATA 116,141,21,173,159,160,
0,39,250,52,2,141,11,53,2,129
400 DATA 12,38,3,141,205,79,53,2
44,23,255,18,198,8,99,132,150
410 DATA 185,48,134,90,38,247,57
,255,255,255,255,255,255,255,255
,0
420 DATA 161,255,255,255,241,255
,255,0,64,255,255,255,255,0,84,2
55
430 DATA 187,0,99,255,255,255,25
5,255,255,255,255,255,255,255,25
5,255
440 DATA 255,255,255,255,255,255
,255,255,255,255,255,255,255,0,1
30,255
450 DATA 255,255,255,255,255,255
,255,141,6,134,32,173,159,160,2,
158
460 DATA 136,140,4,0,35,4,48,31,
159,136,57,220,183,147,186,158
470 DATA 186,99,128,90,38,251,74
,38,248,57,220,136,219,185,137,0
480 DATA 167,141,253,160,150,185
,74,67,167,141,253,153,228,141,2
53,149
490 DATA 166,141,253,144,31,1,22
,255,11,174,141,254,49,191,1,104
500 DATA 174,141,255,69,191,1,10
7,174,141,0,28,48,28,191,1,161
510 DATA 134,57,183,1,142,126,16
9,40,99,141,253,108,57,52,17,174
520 DATA 99,140,169,19,39,3,126,
255,255,52,102,150,179,198,85,61
530 DATA 231,141,253,83,166,102,
31,138,38,55,23,254,245,53,102,5
3
540 DATA 17,50,98,57,52,17,174,1
01,140,185,5,39,2,53,145,189
550 DATA 177,198,166,159,0,166,1
29,64,38,245,189,179,228,131,1,2
55
560 DATA 16,131,1,0,34,7,53,17,5
0,98,126,165,94,198,8,32
570 DATA 220,189,183,11,192,32,3
7,194,134,8,61,227,141,253,3,52
580 DATA 6,142,4,0,159,136,51,14
1,254,108,150,182,72,174,198,48
590 DATA 31,52,16,16,174,98,23,2
53,228,23,253,200,158,136,172,22
8
600 DATA 36,5,23,254,91,32,236,1
42,4,0,159,136,50,100,32,141
610 DATA 999
```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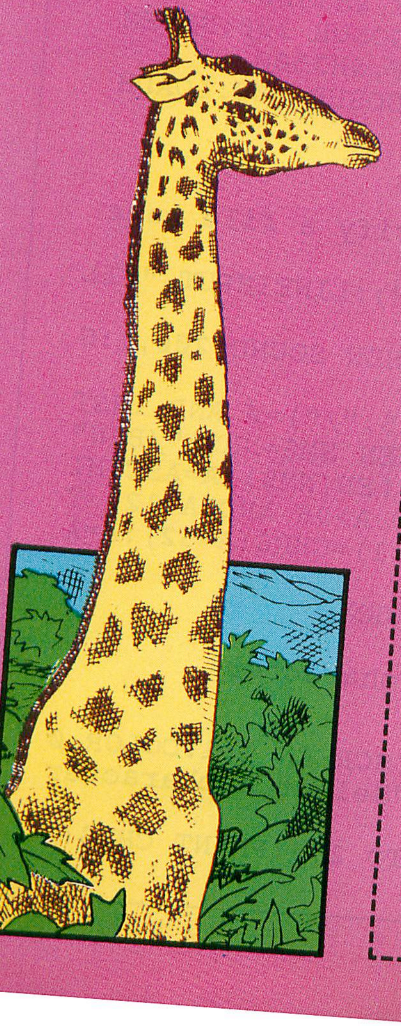

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Listing 3: BOOT

```
10 PCLEAR4:CLS
20 PRINT TAB(9);"* COLOR TEXT *"
30 PRINT:PRINT "SELECT LOAD TYPE
...":PRINT
40 X=0:RESTORE
50 READ A$:IF A$<>"." THEN X=X+1
:PRINT TAB(7);X;") ";A$:GOTO 50
60 DATA TOP OF 16K,TOP OF 32K,UP
PER RAM,.
100 A=VAL(INKEY$):IF A<1 OR A>X
THEN 100
110 ON A GOTO 200,300,400
120 NEW
200 CLEAR 200,&H34FF:LOADM "COLR
TEXT":EXEC:GOTO 120
300 CLEAR 200,&H74FF:LOADM "COLR
TEXT",&H4000:EXEC:GOTO 120
400 CLEAR 200,&H7F00
405 READ A$:IF A$<>"." THEN 405
410 FOR X=&H7F00 TO &H7F19:READ
A$:A=VAL("&H"+A$):POKE X,A:NEXT
420 DATA 34,01,1A,50,8E,80,0,10,
8E,FF,DE,A6,84,6F,21,A7,80,6F,20
,8C,FF,0,25,F3,35,81
430 EXEC &H7F00:POKE &HFFDF,0
440 LOADM "COLRTEXT",&HAB00:EXEC
450 CLEAR 200,&H7FFF
460 GOTO 120
```

```
107 ......221
520 .......62
1000 ......71
1210 .....207
END ......80
```

Listing 4: DEFINE

```
7 PRINTCHR$(27);" ";:POKE&HFFDE,
0:CLEAR200,&H34FF:LOADM"COLRTEXT
":EXEC:DIM X,A,Y,A$,I$(7):DEF FN
C(A)=&H3880+((A-32)*8)
8 JP$=CHR$(13)+CHR$(8)+CHR$(9)+C
HR$(10)+CHR$(94)+CHR$(12)
9 F$=CHR$(254):E$=CHR$(255)
10 PMODE 4,1:SCREEN 1,1
20 PMODE 3,1:COLOR 0,1:CLS:COLOR
 2,0
30 PRINT "* Color text -
          ";:COLOR 3,0:PRINT "
* Character Define Module     ";
40 PMODE 4,1
50 PRINT@128,"Select..."
60 RESTORE:X=0:PRINT
70 READ A$:IF A$<>"." THEN X=X+1
:PRINT TAB(7);RIGHT$(STR$(X),1);
") ";A$:GOTO 70
80 DATA Design characters,Save c
haracter set,Save as loader,Load
 character set,Exit (also CLEAR)
,Warm boot,Cold boot,Directory,.
100 A$=INKEY$:IF A$=CHR$(12) THE
N A=5 ELSE A=VAL(A$):IF A<1 OR A
>X THEN 100
105 IF A=6 THEN PRINT CHR$(27);:
EXEC &HA027 ELSE IF A=7 THEN POK
E &H71,0:EXEC &HA027
107 IF A<>8 THEN 110 ELSE COLOR
0,1:CLS:SCREEN 1,0:DIR:
108 IF INKEY$="" THEN 108 ELSE 1
0
110 IF A=5 THEN COLOR 0,1:CLS:EN
D
120 IF A=2 THEN GOSUB 200:SAVEM
NM$,&H3880,&H3FFF,&H3500
130 IF A=3 THEN GOSUB 200:SAVEM
NM$,&H3500,&H3FFF,&H3500
140 IF A=4 THEN GOSUB 200:LOADM
NM$:GOTO 10
150 GOTO 500
199 '
200 'get and verify a file name
210 '
220 PRINT@480,"";:LINEINPUT "FIL
E NAME =->";NM$
225 IF NM$="" THEN SOUND 200,1:G
OTO 220
230 IF INSTR(NM$,"/")=0 AND INST
R(NM$,".")=0 THEN NM$=NM$+"/BIN"
240 FOR X=1 TO LEN(NM$):A=ASC(MI
D$(NM$,X,1)):IF A>96 AND A<123 T
HEN MID$(NM$,X,1)=CHR$(A-32):A=A
-32
250 NEXT X:RETURN
500 '
510 'select a character
520 '

530 PMODE 4,1:SCREEN 1,1:COLOR 0
,1:CLS:PRINT "Select a character
...":PRINT
540 FOR X=32 TO 255:PRINT CHR$(X
);:NEXT
```

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```
560 PRINT@416,"By moving the cur
sor with the   arrow keys, and t
hen pressing   ENTER. (Press CLE
AR to return)  ";
600 PRINT@CX+(CY+2)*32,CHR$(6);
610 A$=INKEY$:IF A$="" THEN 610
620 PRINT@CX+(CY+2)*32,CHR$(6);
635 FOR Y=341 TO 344:POKE Y,255:
NEXT
640 X=INSTR(JP$,A$):IF X=0 THEN
600
650 ON X GOTO 1000,660,670,680,6
90,10
660 CX=CX-1:IF CX<0 THEN CX=31
665 GOTO 600
670 CX=CX+1:IF CX=32 THEN CX=0
675 GOTO 600
680 CY=CY+1:IF CY>6 THEN CY=0
685 GOTO 600
690 CY=CY-1:IF CY<0 THEN CY=6
695 GOTO 600
1000 '
1001 'define/modify a character
1002 '
1010 C=32+CX+(CY*32):CA=FNC(C)
1020 PMODE 0,1:SCREEN 1,1:COLOR
0,1:CLS236
1030 PRINT "  * DEFINER *   ";
1050 PRINT@32,"";:GOSUB 2000 'ge
t image to I$
1060 COLOR 1,0:FOR X=0 TO 7:PRIN
T@36+(X*16),I$(X);:NEXT X
1070 DX=0:DY=0
1100 PRINT@36+(DY*16)+DX,CHR$(6)
;:A$=INKEY$:PRINT@36+(DY*16)+DX,
CHR$(6);
1105 IF A$=" " THEN 1200
1110 IF A$="" THEN 1100
1130 X=INSTR(JP$,A$):IF X=0 THEN
 1100
1140 ON X GOTO 3000,1150,1160,11
70,1180,500
1150 DX=DX-1:IF DX<0 THEN DX=7
1155 GOTO 1100
1160 DX=DX+1:IF DX=8 THEN DX=0
1165 GOTO 1100
1170 DY=DY+1:IF DY=8 THEN DY=0
1175 GOTO 1100
1180 DY=DY-1:IF DY<0 THEN DY=7
1185 GOTO 1100
1200 'reverse character
1210 IF MID$(I$(DY),DX+1,1)=F$ T
HEN MID$(I$(DY),DX+1,1)=E$ ELSE
MID$(I$(DY),DX+1,1)=F$
1220 PRINT@36+(DY*16),I$(DY);:GO
TO 1100
2000 'Get image into I$(0-7)
2010 FOR X=0 TO 7:A=PEEK(CA+X):I
$(X)="":IF A=255 THEN I$(X)=STRI
NG$(8,E$):NEXT X:RETURN
2020 FOR Y=7 TO 0 STEP -1
2030 IF (A AND 2^Y)=0 THEN I$(X)
=I$(X)+F$ ELSE I$(X)=I$(X)+E$
2040 NEXT Y:PRINT@36+(X*16),I$(X
):NEXT X:RETURN
2999 '
3000 'set character
3001 '
3010 COLOR 0,1:FOR X=0 TO 7:PRIN
T@36+(X*16),I$(X);
3020 A=0:FOR Y=7 TO 0 STEP-1
3030 IF MID$(I$(X),8-Y,1)<>F$ TH
EN A=A+2^Y
3040 NEXT Y:POKE CA+X,A:NEXT X:G
OTO 500
```

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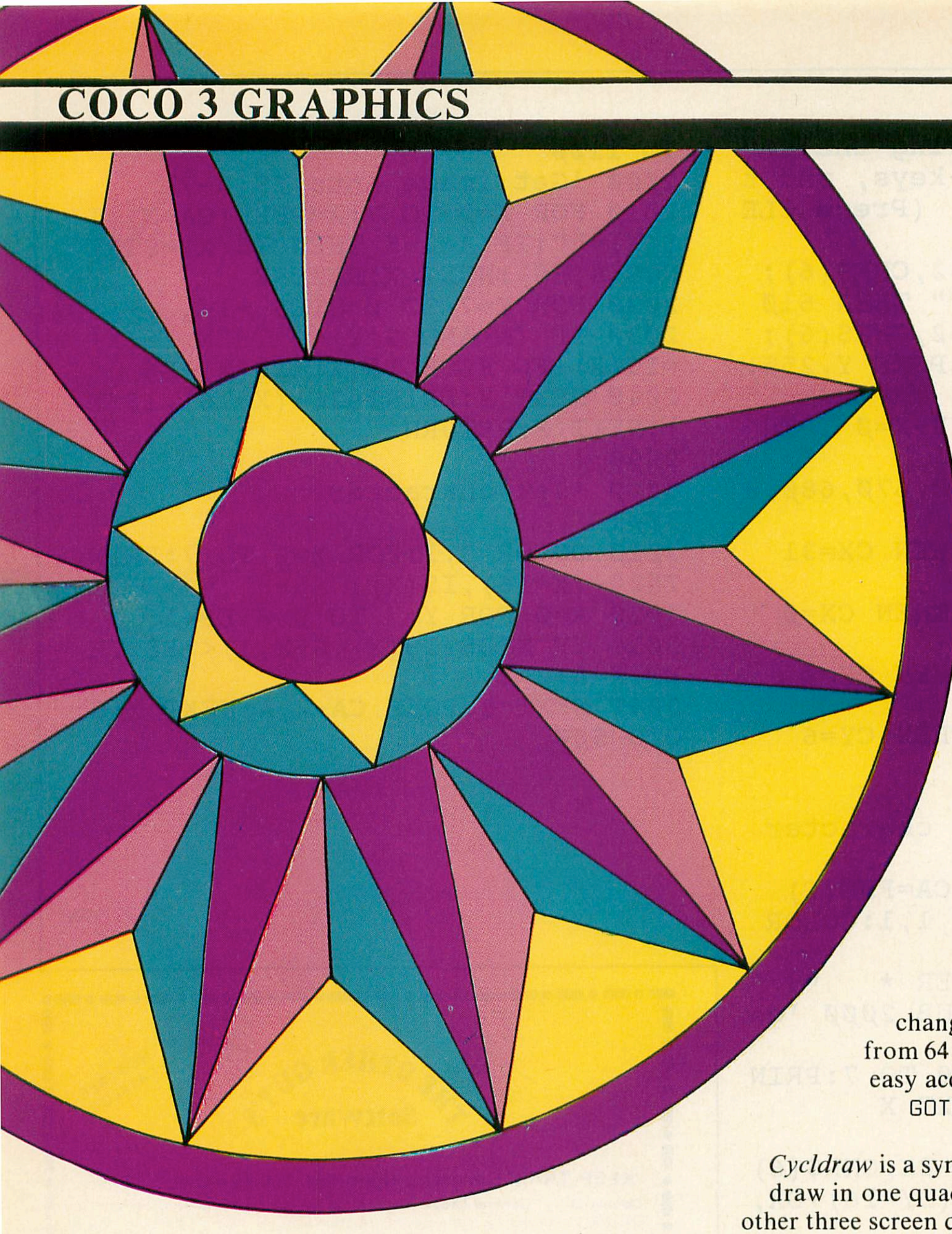


A Cycle-delic Palette

By Becky F. Matthews

Cycldraw demonstrates some of the best features of the new CoCo 3 — a high resolution screen with 16 colors and color text, a PALETTE command to change those colors at any time (you choose from 64 possible colors), a BUTTON function for easy access of the joystick buttons, an ON BRK GOTO (on break) command and an ON ERR GOTO (on error) command.

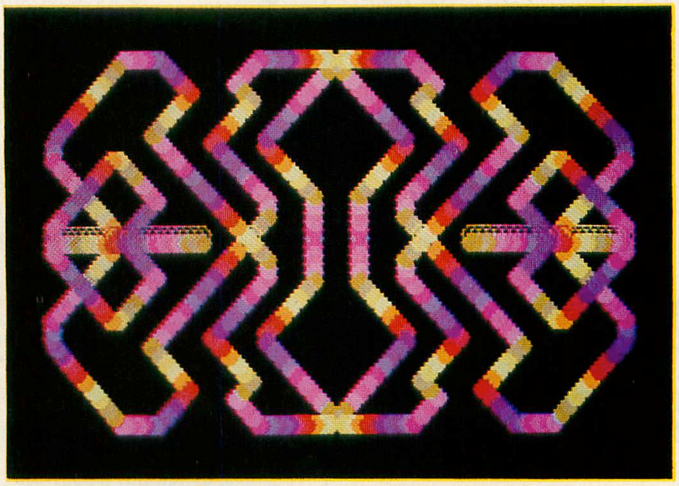
Cycldraw is a symmetrical drawing program. What you draw in one quadrant of the screen is duplicated in the other three screen quadrants (a kaleidoscope effect). Also the palette of colors is continously changing ("color cycling") as you draw, demonstrating a fascinating feature of the new CoCo.

All you need to do is CLOAD"CYCLDRAW, use the right joystick and follow the instructions you see on your screen. Happy Cycling!

(If you have any questions, feel free to direct them to B. Matthews, 3917 Baxter Street, Nashville, TN 37216. Please enclose an SASE.) ☐

Becky Matthews has a degree in music education from the University of Mississippi. She and her husband, David, have three CoCos and two CoCo cats.

Discover the rainbow inside your CoCo 3



280	68
520	243
780	106
1020	47
END	107

The listing: CYCLDRAW

```
10 '*** CIRCLE CYCLE DRAW ***
20 '*** BY BECKY MATTHEWS ***
30 ON BRK GOTO 920
40 ON ERR GOTO 60
50 POKE 65497,0
60 '*TITLE PAGE
70 HSCREEN 2
80 HCLS 8
90 HCOLOR 4,8
100 HPRINT (11,4)," CIRCLE CYCLE
 DRAW "
110 'SMALL CIRCLES
120 C=1
130 FORX=15TO315STEP14
140 C=C+2:IFC>15THENC=1
150 FORY=9TO182STEP173
160 HCIRCLE(X,Y),5,C
170 HPAINT(X,Y),C,C
180 NEXTY:SOUND X/2,1:NEXTX
190 'MEDIUM CIRCLES
200 C=1
210 FORY=30TO160STEP26
220 C=C+2
230 FORX=10TO310STEP300
240 HCIRCLE(X,Y),10,C
250 HPAINT(X,Y),C,C
260 NEXTX:SOUND Y/2,1:NEXTY
270 'LARGE CIRCLES
280 C=1
290 FORY=45TO160STEP49
300 C=C+2
310 FORX=45TO275STEP230
320 HCIRCLE(X,Y),20,C
330 HPAINT(X,Y),C,C
340 NEXTX:SOUND Y/2,1:NEXTY
350 'MENU
360 HPRINT (10,11)," CHOOSE CIRC
LE SIZE"
370 HPRINT (14,14)," 1 - SMALL "
380 HPRINT (14,15)," 2 - MEDIUM"
390 HPRINT (14,16), " 3 - LARGE
"
```

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```
400 HPRINT (13,20)," (ENTER 1-3)
"
410 A$=INKEY$:IF A$=""THEN410
420 A=VAL(A$)
430 IF A<1 OR A>3 THEN 400
440 'SET CIRCLE RADIUS
450 R=A*5
460 '*INSTRUCTION PAGE
470 HCLS4
480 HCOLOR 8,4
490 HPRINT (14,2),"INSTRUCTIONS"
500 HPRINT (2,7),"USE THE RIGHT
JOYSTICK TO DRAW."
510 HPRINT (2,10),"PRESS JOYSTIC
K BUTTON TO CLEAR SCREEN."
520 HPRINT (2,11),"(RIGHT BUTTON
 1 ON NEW JOYSTICK)"
530 HPRINT (2,14),"PRESS SPACEBA
R TO PAUSE DRAWING AND"
540 HPRINT (2,15),"SEE FAST CYCL
E."
550 HPRINT (2,18),"PRESS SPACEBA
R AGAIN TO RESUME."
560 HPRINT (7,22),"(PRESS ANY KE
Y TO START)"
570 A$=INKEY$:IFA$=""THEN570
580 X=148:Y=96
590 T=1:C=1
600 'SET BACKGROUND TO BLACK
610 PALETTE 0,0
620 HCLS0
630 'BUTTON CHECK
640 IF BUTTON(0)=1 THEN 620
650 'SPACEBAR CHECK
660 A$=INKEY$:IF A$=CHR$(32) GOS
UB 1220
670 'GOSUB ADVANCE PALETTE
680 GOSUB 850
690 'JOYSTICK CHECK
700 H=JOYSTK(0)
710 IF H>41 THEN X=X+4
720 IF H<20 THEN X=X-4
730 IF X<10 THEN X=10
740 IF X>310 THEN X=310
750 V=JOYSTK(1)
760 IF V>41 THEN Y=Y+4
770 IF V<20 THEN Y=Y-4
780 IF Y>182 THEN Y=182
790 IF Y<10 THEN Y=10
800 IF H<160 AND V<96 THEN 980
810 IF H>160 AND V<96 THEN 1040
820 IF H<160 AND V>96 THEN 1100
830 IF H>160 AND V>96 THEN 1160
840 GOTO 630
850 '*ADVANCE PALETTE SUB
860 FOR P=1 TO 15
870 PALETTE P,T+P
880 NEXT
890 T=T+5:IFT>49 THEN T=1
900 C=C+1:IFC>15 THEN C=1
910 RETURN
920 '*END
930 PALETTE RGB:CLS
940 PRINT"BYE FOR NOW."
950 POKE65496,0
960 FORN=100TO1STEP-5:SOUND N,1:
NEXT
970 END
980 '*QUADRANT 1 SUB
990 HCIRCLE(X,Y),R,C:HPAINT(X,Y)
,C,C
1000 HCIRCLE(320-X,Y),R,C:HPAINT
(320-X,Y),C,C
1010 HCIRCLE(X,192-Y),R,C:HPAINT
(X,192-Y),C,C
1020 HCIRCLE(320-X,192-Y),R,C:HP
AINT(320-X,192-Y),C,C
1030 GOTO630
1040 '*QUADRANT 2 SUB
1050 HCIRCLE(X,Y),R,C:HPAINT(X,Y
),C,C
1060 HCIRCLE(320-X,Y),R,C:HPAINT
(320-X,Y),C,C
1070 HCIRCLE(320-X,192-Y),R,C:HP
AING(320-X,192-Y),C,C
1080 HCIRCLE(X,192-Y),R,C:HPAINT
(X,192-Y),C,C
1090 GOTO630
1100 '*QUADRANT 3 SUB
1110 HCIRCLE(X,Y),R,C:HPAINT(X,Y
),C,C
1120 HCIRCLE(X,192-Y),R,C:HPAINT
(X,192-Y),C,C
1130 HCIRCLE(320-X,192-Y),R,C:HP
AINT(320-X,192-Y),C,C
1140 HCIRCLE(320-X,Y),R,C:HPAINT
(320-X,Y),C,C
1150 GOTO630
1160 '*QUADRANT 4 SUB
1170 HCIRCLE(X,Y),R,C:HPAINT(X,Y
),C,C
1180 HCIRCLE(X,192-Y),R,C:HPAINT
(X,192-Y),R,C
1190 HCIRCLE(320-X,Y),R,C:HPAINT
(320-X,Y),C,C
1200 HCIRCLE(320-X,192-Y),R,C:HP
AINT(320-X,192-Y),C,C
1210 GOTO630
1220 '*CYCLE ONLY SUB
1230 FOR P = 1 TO 15
1240 PALETTE P,T+P
1250 NEXT
1260 T=T+4:IFT>49 THEN T=1
1270 'SPACEBAR CHECK
1280 IF INKEY$="" THEN 1230
1290 RETURN
```

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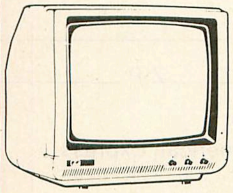

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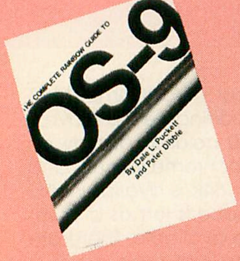
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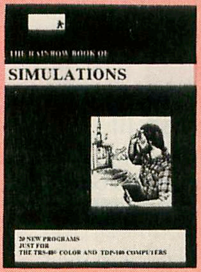
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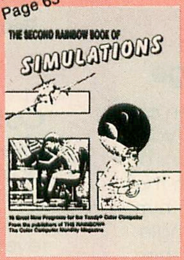

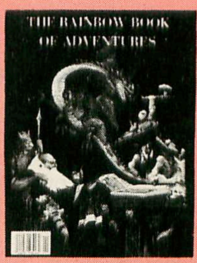

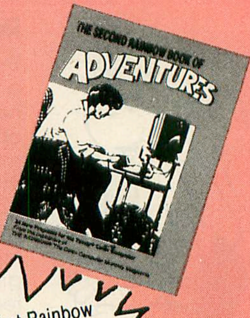

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Do Teachers Like Computers?

By Michael Plog, Ph.D.
Rainbow Contributing Editor

Many studies in the past have looked at the numbers of computers in schools. In this column, we have reported the growing number of machines available to students and teachers. With such unusual growth, most people now accept that computers have an important role to play in schools. The type of role, however, will depend in large part on how teachers use computers and how teachers view the effectiveness of computers.

There has not been much study of how teachers view computer use in schools, or of teacher attitudes about computers. One study, however, was conducted by H.J. Baker and reported by the U.S. Department of Education, Center for Educational Statistics. Baker's study was based on 2,700 questionnaires sent to teachers in all grade levels throughout the country. Questionnaires were returned by 80 percent of the teachers (2,160) — a return rate that is very impressive for mailed surveys.

In addition to asking how the teachers use computers, eight questions were asked about teacher attitudes toward computers. The questions, along with the percent of each response, are presented in the table.

Most teachers (82 percent either agreed or strongly agreed) felt that computers can help teachers teach more effectively. Thirteen percent had no opinion about the question. This indicates fairly strong support for educational uses of computers by teachers, even by non-users. Just considering those who provided an opinion (eliminating the "No Opinion" group), about 95 percent agreed or strongly agreed with the statement.

Since any educational activity is dependent on teachers, this support is crucial for computer use in schools. If teachers do not support using machines for educational purposes, then any efforts by administrators will collapse.

A potential positive teacher attitude for classroom computers may also be demonstrated by the second question about disruption to classes. Thirteen percent of the teachers thought having one or two students working on a computer would disrupt the rest of the class, while 63 percent thought it would not be disruptive. Nearly one-fourth (24 percent) had no opinion about disruption.

One possible explanation for the large number of "No Opinion" responses is the use of computer labs in schools. Many teachers who have students use computers do so in a lab situation; computers are not available in classrooms. Thus, some teachers may

Table 1: Teacher Attitudes About Computers

Item	SA	A	D	SD	NO
Computers can help teachers teach more effectively.	28	54	4	*	13
Having one or two students work at a computer is seriously disruptive to the rest of my classroom activity.	2	11	40	23	24
I want more training in computers.	46	44	3	1	7
The software available to me is quite good, instructionally.	5	30	10	7	49
I do not feel comfortable about working with computers.	8	23	31	20	18
Previewing software should be done by teachers before purchase.	46	44	1	*	9
Integrating computer time with other subject areas is a fairly simple matter.	4	28	25	8	34
The hardware, or equipment, is difficult to use.	1	7	37	14	41

SA = Strongly Agree
A = Agree
D = Disagree
SD = Strongly Disagree
NO = No Opinion
* = Less than 1 percent

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in the central office of a school district and is currently employed at the Illinois State Board of Education.

never have been in a position of having students work on a computer while something else is going on in the classroom.

In one sense, the question of disruption is not very powerful for measuring teacher attitudes about support for computer uses in schools. I used the term "potential positive teacher attitude," but another factor is involved besides teacher acceptance of computers — teacher style. Some teachers want all students in the class to be doing the same work at the same time. Other teachers encourage, even thrive, on a variety of activities in the same physical space at the same time. It is possible that some of the "all the same" teachers have a very positive attitude toward educational use of computers, but do not want a few students away from the lesson and working on computers. It is also possible that some of the "different activities at the same time" teachers do not think any disruption would occur in their class if a few students were working on the machines, but do not have a positive attitude toward computers. Thus, it is difficult (maybe impossible) to gauge teacher attitudes by this question.

An overwhelming majority of teachers (90 percent) said they want more computer training. Four percent said they do not want more training, and 7 percent had no opinion on the question.

It is possible, of course, that the 4 percent of teachers not wanting more training support computer use in schools, but feel they already know enough. While possible, this is unlikely. It is much more probable that this 4 percent represent teachers who feel no need for computer use in their classes. One of the features of computer knowledge is that mastery is never totally achieved. There is always additional software to learn, extra "helpful hints" to file away, and even new machines to examine.

The next survey question, about quality of software, does not appear to be a very productive item. Nearly half of the teachers (49 percent) did not express an opinion about the question. Of those who did have an opinion about software, about twice as many (35 percent compared to 17 percent) thought available software is instructionally good.

It seems to me that teachers can fall into three broad categories: those who have examined almost no educational software; those who have examined a little bit of software; and those who are familiar with a lot of software. The question, as stated, is somewhat inappropriate for teachers with very limited or very great experience with software. Those who have very limited experience with software cannot really answer the question. Teachers who have examined a great deal of software have probably seen some very bad materials and some very good materials; it would be difficult to respond to the question.

About half of the teachers surveyed (51 percent) said they feel comfortable working with computers. Nearly one-third (31 percent) said they do not feel comfortable. It is interesting to note that whether teachers feel comfortable with computers or not, most still want more training. This question is probably the single most changeable item on the whole survey. Teachers are continually receiving in-service instruction on computers, sponsored by school districts, regional centers, computer consortia and state education agencies. Each month, a few more teachers will feel comfortable working with computers. Naturally, there will always be a few teachers who are not comfortable with computers and who will have minimal use of the machines in classes. But, that number will decrease with each successive year.

Nearly all respondents to the survey felt that teachers should preview software before purchase. I wonder why 9 percent of teachers had no opinion on this item and 1 percent disagreed. Could they be thinking of review by school people other than teachers, such as administrators, parents or students?

If you want to start a spirited discussion in a teachers' lounge, make the comment, "Integrating computer time with other subject areas is a fairly simple matter." About one-third of the respondents to the survey (32 percent) agreed with the statement; about one-third (33 percent) disagreed; and about one-third (34 percent) had no opinion. The degree of ease or difficulty of integrating computers with other subjects may be related to several factors: particular subject matter taught, age and abilities of students, degree of knowledge and creativity of teachers, and quality of available software.

About half of the teachers (51 percent) said the equipment is not difficult to use; only 8 percent said it is. This leaves 41 percent without an opinion. Are the "No Opinion" people those who have not used computers, or those who realize some equipment is easy to use and some is hard to use?

In conclusion, it seems there are some generalizations from this study that would be worthwhile for educators to consider. First, in-service training about computers is still important for teachers. A small amount of that training should be for operating equipment. The bulk of the training should concentrate on two major topics: suggestions for integration of computers into subject matter areas and selection of educational software (possibly including sessions of "what makes a good software package").

For more information about this study, contact Janice Ancarrow at the Center for Educational Statistics, 555 New Jersey Avenue, N.W., Washington, DC 20208. If you want to communicate with me about the study, please send your thoughts to 829 Evergreen, Chatham, IL 62629.

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The listing:

```
10 CLEAR:INPUT"DECIMAL #";Y:FORX
=15TO0STEP-1:IFY>=Z+INT(2^X)THEN
Z=Z+INT(2^X):A$=A$+"1":NEXTX:IFY
>65535ORY<>ABS(INT(Y))THENPRINT"
INVALID":GOTO10ELSEPRINTA$:GOTO1
0ELSEA$=A$+"0":NEXTX:IFY>65535OR
Y<>INT(ABS(Y))THENPRINT"INVALID"
:GOTO10ELSEPRINTA$:GOTO10
```

Gregory Satir
Fairfield, CT

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

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SIG Changes Include New Selections, New Sections

By Cray Augsburg
Rainbow CoCo SIGop

Several changes have taken place on the CoCo SIG. First, the Subscriptions menu has been changed to "Rainbow Magazine Services." To enter this area, type `R` at the CoCo SIG prompt. To make things more logical, the "Order RAINBOWfest Tickets" and "Address Change" selections have been moved from the Questions & Feedback section to this new section. The new section includes a selection, "Ask The Experts," for sending mail to Marty Goodman, Dan Downard or Richard Esposito. Just select the person you want the technical question to go to and then fill in the blanks. You will be asked for your name and address and then be given plenty of space to ask your question. We believe this will help us get your questions answered in a timely manner.

Another change has come about that has somewhat altered the SIG structure as we knew it before. To better handle the increasing interest in OS-9, we decided to create a new SIG directly pertaining to the OS-9 operating system. While designed for CoCo OS-9 users, it can be used by OS-9 68K users, too, and even has a database topic set aside for such computers. This new area can be reached by typing `OS9` at the CoCo SIG prompt. Once in "OS-9 Online," you will be greeted with the menu. This new SIG includes a Forum and a Mail section, and most importantly, its own database area. This database area is separate from the normal CoCo SIG database area. This will make it easy for those interested in OS-9, since the database area will have 16 topics corresponding to more specific aspects of OS-9.

Clearing Up Telenet

Several people have said they were

DATABASE REPORT

To further assist us with providing our membership with prompt, expert advice, we have enlarged our staff complement of OS-9 experts. **Greg Law** (GREGL) now joins **Dale Lear** (DALELEAR) and **Rick Adams** (RICKADAMS) as part of our Delphi OS-9 staff. Greg has many years of experience with OS-9, and is a C and 6809 assembly language programmer as well. Welcome, Greg!

We have quite a treat in store for you OS-9 Level I users. **Mike Dziedzic** (MJD) has sent us a set of drivers for the 80-column screen of the CoCo 3, to be used under OS-9 Level I Version 2.0. Along with the addition of material from **Kevin Darling** (KDARLING), this should be a very popular set of files. These can be found in the OS-9 section of the CoCo SIG database or, if "OS-9 Online" is open by the time you read this, in the Drivers section of this new OS-9 SIG.

We haven't forgotten all you RS-DOS users, though. For all CoCo RS-DOS users we have a treat in store: **Greg Miller** (GREGMILLER) who, with **Erik Gavriluk** (ERIKGAV), brought us *McPaint*, has kindly uploaded his CoCo terminal program *Greg-E-Term*. *GEterm* runs on all models of CoCo. On the CoCo 1 and 2 it supports either the bit-banger or the hardware RS-232 pak.

It offers screen display options of 32, 51, 64, or 85 columns, or support for the Word-Pak II (and with soon-to-be-posted minor patches, support for the Word-Pak I and Word-Pak-RS as well) and the double-density, 80-column board. It works perfectly for Xmodem up- and downloading at 1200 baud through the bit-banger port. Of course, its terminal mode function in full duplex at 1200 baud through the bit-banger is less than perfect, but it is usable.

GETerm supports the 32-, 40- and 80-column display of the CoCo 3 as well, and has special routines written explicitly for the CoCo 3 to use its better bit-banger port at 1200 baud more smoothly than any CoCo 1 or 2 program ever could. It also features viewing and marking of its buffer, and the use of both `FIND` and formatting commands for navigating in and printing the buffer.

GETerm comes with a configure program, a help file, and two documentation files that total over 540K of information on the program. This is a major new "guiltware" terminal program entry into the CoCo world. Believe me, this is a *must get* program. It is well worth the time needed to download all 50K or so worth of material in the *GETerm* group. *GETerm* is to be found in the Data Communications section of the CoCo SIG. The CoCo Community owes Greg Miller a *big* thank you.

Greg's partner, Erik, has not been loafing either. He has sent us a version of the Macintosh Picture Converter for the CoCo 3. This program allows you to download a Macintosh picture file from Macintosh-oriented BBS systems from a friend with a Mac, and then view it on the CoCo 3. The CoCo 3 version of the Mac converter displays the full horizontal width of the Mac image, though of course it has to scroll through the full vertical height of the larger Mac pictures.

Cray Augsburg is RAINBOW's technical assistant and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Ky. His username on Delphi is RAINBOWMAG.

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unable to log onto Delphi at eight bits, no parity and one stop bit. After checking into the matter, we discovered some features of Telenet that should help. If you are accessing at 300 or 1200 baud, when a connection is achieved, press ENTER, then type `D` and press ENTER again. Note that the 'D' must be uppercase. Then proceed to log on as usual. If you are accessing Delphi at 2400 baud, when a connection is made, type `@D` and press ENTER. Again, the 'D' must be uppercase. As an aside, if you are using a terminal package that features VT-100 emulation, you can type `D1` (uppercase 'D') and press ENTER at the "Terminal=" prompt. This will tell Telenet you want to use VT-100 emulation.

More on Settings

The Xmodem settings area (in the Settings area of your Workspace) lets you set four different parameters regarding how you want the system to handle Xmodem file transfers. They are "Error Check Mode," "Last Block Handling," "Retry Count" and "Timeout Period."

Two types of Xmodem error checking are available on Delphi: Checksum and CRC (Cyclic Redundancy Check). Checksum error checking has been around for a long time and is the most common method, so any terminal program that supports Xmodem will support this method of error checking. Because of this, Checksum is the default error-checking method on Delphi. However, CRC error checking is considerably more accurate. If your terminal program happens to support this, by all means use it. In any event, the error-checking selection you choose only affects uploading. For downloading, Delphi automatically adjusts itself to the mode requested by your terminal package.

The "Last Block Handling" option is of little consequence to most users. It lets you set how the last block of an Xmodem text download is handled by the system. In the "Normal Handling" mode, which is the default, the last block is padded with null characters to fill it out to a standard 128-byte Xmodem block and a CONTROL-Z is sent to close the file.

Two other methods for handling the last block are available; "Atari Mode," which is obviously for users of an Atari microcomputer, and a "No CONTROL-Z" mode for users of certain Apple computers.

Of more direct importance to users of the CoCo SIG are the "Retry Count" and "Timeout Period" Xmodem settings. The Retry Count is the number of times the system tries to recover from

The Macintosh Picture Converter for the CoCo 3 can be found either in the CoCo 3 News section or, more likely by the time you read this, in the Graphics database.

Art Flexser (ARTFLEXSER) has sent us patches for modifying *Colorcom/E* to work on the CoCo 3. These will be found either in the CoCo 3 News section or in the Data Communications section of the CoCo SIG.

Why the uncertainty on my part about where to find some of these files? By the time you read this, we will be taking apart our CoCo 3 News and Information topic area and moving most of the files in it to the other topic areas on the CoCo SIG database. As we move each file, if it is a CoCo 3-specific file, we will flag it with "(C3)" in the group name title, and will give it a keyword of `C3`, to allow you to scan the other databases to look for CoCo 3-specific files. This change is being implemented during December and January, and should be completed by the time you read these words.

In the CoCo 3 News and Information database (or, more likely, in other appropriate databases by the time you read this), we have from **Steve Bjork** (6809ER), *NewBoot*, a program to allow owners of *Ghana Bwana*, *Desert Rider* and *One on One* the ability to fix CoCo 3-incompatibility problems in these games, and manipulate the color set. **Jim Shoop** (BAZAR) has provided a patch for some versions of *VIP Writer* to make it run on the CoCo 3. **Bob Wharton** (BOBWHARTON) sent us a color-bar utility and an X-MAS newsletter for the CoCo 3, and Kevin Darling has sent us a text file with yet more information on the working of the GIME chip, including a full pin-out of it. **Bill Jackson** (BILLJACKSON) provided a printer spooler for the CoCo 3, and **Damon Hill** (DWHILL) has sent us an interesting Microware press release. **Frank Hogg** (FHOGG) of Frank Hogg Lab has also given us a text file telling us of his company's plans to support the CoCo 3 under OS-9 Level II. **Loren Howell** (XENOS) has sent us a CGP-220 screen dump program. He also has given us a CoCo 3 drawing utility called *HDOODLE*. **Roger Bouchard** (HARBIE), our official CoCo 3 BASIC Bug Finder and Swatter, has sent us an update to his previous file of CoCo 3 BASIC bugs and fixes for them. **Michael Fischer** (MIKE88) has given us some "Fun Pokes" for the CoCo 3, and **Steve Macri** (DRACMAN) has sent us his *Kellybook* program. **Gene Loefer** (GLOEFER) has given us an RGB palette utility. Mike Dziedzic has presented us with a *real* tour de force: An ML program that displays all 64 RGB palette colors on the CoCo 3 screen at once (using the same sneaky trick that Rick Adams used in his article in RAINBOW). **Doug Masten** (DMASTEN) has sent us a lowercase utility. **Al Gengler** (AJG) has sent us a utility for calculating `HBUFFER` sizes. **Andrew Ellinor** (CROPPER) has sent us *CC3 Start*, containing some start-up pokes for the CoCo 3 BASIC. **Derrick Kardos** (DTG) has also sent us some CoCo BASIC programs.

Finally, in this area (or in the Hardware Hacking area), I have uploaded for hardware hackers a fascinating file that contains a complete description of exactly what goes on inside the new Tandy PAL chip for the older multipacks. **Bob Lentz** (president of the Microworks, makers of Macro 80C Assembler and the DS-69 and DS-69A digitizer for the CoCo) "read" that PAL chip, and has provided us hackers with invaluable information on just what it does.

As stated above, it is likely that all the material currently in the OS-9 section of the CoCo SIG will be moved to OS9 Online by the time you read this. So you may have to look around there in an appropriate topic section to find the following material. As I write this, the following new material has arrived in our OS-9 area: Kevin Darling has sent us an "SCF Editor Plus." Rick Adams, one of our staff and author of the famous `MONO` command for OS-9 on the CoCo 3, has gone one better and given us a `COLOR` function to change the text colors on the CoCo 3. **Mark Sunderlin** (MEGABYTE) has sent us a mammoth amount of material on his favorite error-checking/error-correcting protocol, Kermit. This includes a Kermit program for the CoCo under OS-9, and complete tech specs on the Kermit protocol. **Dan Connolly** (CONNOLLY) has provided a grouping of files that includes instructions on modifying the hardware of some Word-Pak I's and II's to allow them to have their ports moved to the same address as that of the Word-Pak RS, thereby making them compatible with the CoCo 3 Multipak. He also provides driver software for the the Word-Pak in this group. **Ronald Cole** (RONALDCOLE) has sent us a fix for the OS-9 Level I Version 2 clock module.

In the Utilities section of the CoCo SIG, **Paul K. Ward** (PKW) has sent us a very professional review of relational database programs, a field he has considerable expertise in. **Kenneth L. Wuelzer** (WUELZERKEN) has sent us an update to his amazing `KDISK` editor, that edits RS-DOS, MS-DOS, and Flex disks. **Christopher Rak** (DUNSEL) has sent us a disk index program. **Jim Zito** (JIMZ) and **Steve Fabiszak** (SJFRAF) have also sent us utilities.

In the Graphics database, Greg Miller has sent us an Atari ST picture converter, that allows a CoCo to download and

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a bad data or timeout error before giving up and aborting the Xmodem transfer. This can be set to any number between one and 127. The system default is 10 retries.

The "Timeout Period" parameter dictates how long the system waits for you to send a block during an upload, or how long it waits for a reply after sending your computer a block during a download. In either case, if the timeout period expires before the system receives the appropriate response, a timeout error is recorded internally and the block is transferred again.

The system default for timeout is 15 seconds, but can be changed to any number of seconds between one and 127. If you often experience timeout errors during Xmodem file transfers, you may want to increase this number. Also, Delphi users in other countries will probably want to select a long timeout period because of multiple-network delays. Decreasing the timeout period will generally result in faster recovery from errors during a transfer, but may also cause unnecessary errors to be generated.

That's it for this installment of Delphi Bureau. We will try to devote a little more space to other advanced settings in Workspace next time. □

display Atari ST *Degas* format pictures. Unfortunately, this will be of limited use until we can get routines for "uncompressing" some of the Atari pictures currently on Delphi. **Noel Fallon** (FALLON), one of the most talented CoCo artists I have ever seen, and also SysOp of the Shambala BBS in Oklahoma, has sent us a gallery of some of the *CoCo Max* and *Graphicom* art he has done over the years. **Richard P. Trasborg** (TRAS) has sent us an RLE picture converter and several nude female images. **Don Hutchison** (DONHUTCHISON) has given us a dream-girl picture. **John Stewart** (HOOP) has sent us a DMP-105 screen dump routine, and **Emery Mandel** (EMANDEL) has uploaded a fascinating animated cube demo.

In the Music database we have some outstanding new uploads of classical material from **Ray Wright** (RAYWRI) and **Scott Milliken** (IDIOT). **Tim Collier** (TIMEXTWIN) has sent us "Spring," and **Mark Raphael** (MARKRAPHAEL) and Michael Fischer have sent us other tunes. In the Games topic area, **Darrell S. Dillman** (MINNER) has sent us *Moonbase One*, an Adventure game.

In the Product Reviews topic area **Denny Skala** (DENNYSKALA) has sent us a very professional review of the Magnavox 8CM515 monitor, which is fast becoming the most popular third-party RGB A color monitor for the CoCo 3. In the Data Communications area, I have uploaded a little modifier program for *Mikeyterm* that allows you to alter the port address it looks at for talking to the RS-232 hardware, and thus allows you to use it with a Tandy Modem Pak, the alternate port on a PBJ 2SP Pak, or with a "CoCo-ized" Dragon computer.

As you can see, our SIG has been *very*

As you can see, our SIG has been *very*

busy this last month. Those of us on the staff here want to thank all of you who have ever contributed or dropped by, for your help and patronage. A few days after I send this article to RAINBOW we will have passed the 20,000 mark in forum messages, and will be the first Delphi SIG to do so. [Michael Fischer, of Great River, NY, posted the 20,000th message on December 12.]

I am extremely pleased with the success of our service, and am looking forward to all of the changes that are in progress, which will make us even better able to support CoCo and OS-9 users. Thanks again to all of you! See you on the CoCo SIG!

— Marty Goodman
RAINBOW's Delphi Database Manager

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

Hint . . .

Delay Play

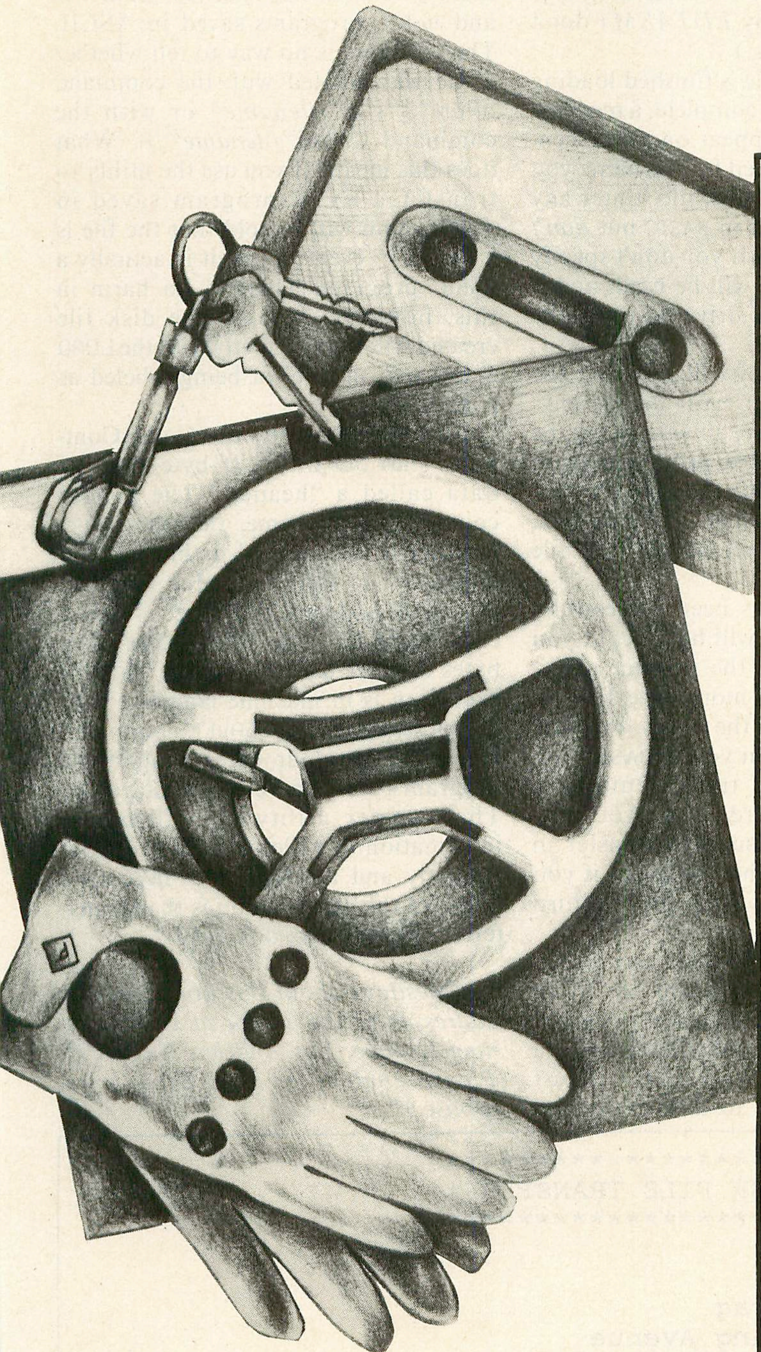
I have found an interesting way to utilize the `POKE&HFF21,&H3C` and `POKE&HFF21,&H34`. For those who don't know, these pokes turn the cassette motor relay on and off, respectively. You can use this to alter the way a tape sounds. Put a voice or music tape in your recorder and unplug all computer plugs from the recorder except the remote plug. Then run the following program:

```
10 INPUT"SPEED";A
20 POKE&HFF21,&H3C
30 FOR X=1 TO A:NEXTX
40 POKE&HFF21,&H34
50 GOTO20
```

Since the value for A is a delay factor, the larger A is, the slower the tape will be played back.

Jon Nash
Tulsa, OK

16K
Disk



The Limousine Utility: A Tape-To-Disk Transfer Vehicle

By Roger Schrag

When lots of folks first get a Color Computer, they hook up a cassette recorder to save their programs, figuring they will get a disk drive later on. By the time they do get a disk drive, they have accumulated a large library of programs and data files on tape.

It then becomes something of a chore to transfer all of those files from tape to disk. A BASIC program needs to be loaded from tape and saved to disk. A machine language program needs to be `CLOADM`ed from tape, analyzed so that the addresses may be found, and finally `SAVEM`ed to disk. Transferring data files, meanwhile, can often be a total nightmare.

What I would like to present here is a simple tape-to-disk file transferring utility. The source code is shown in the program listing, and may be keyed in and assembled with most any editor/assembler in a straightforward manner.

In short, this utility will read just about any standard tape file and transfer it to disk. The disk file will have the exact same attributes (BASIC or machine language, ASCII or binary, etc.) as the tape file, and the disk file will be fully loadable and operational.

Since this utility uses three undocumented routines in the

(This article first appeared in the January 1984 issue of THE RAINBOW. Due to its popularity and to the advent of our RAINBOW ON DISK service, we are reprinting this useful utility.

While this reprinting is something of a first, it is a special case because the issue of the magazine in which it appeared is out of print and back issues are no longer available.

This does not, by any means, signal any intention to "recycle" other material from previous issues.)

Roger Schrag, currently studying computer science at the University of California at Berkeley, enjoys working with CoCo and writing articles for THE RAINBOW.

disk ROM, it may not work on systems with other than Radio Shack Disk BASIC. It checks to see which version of the disk ROM you have, and then branches to the appropriate address.

To transfer a file from tape to disk, load the assembled program and execute it. The screen will clear and you will be prompted to prepare the cassette containing the file to be transferred and to press ENTER. Cue the tape to the beginning of the file and press ENTER. The tape's sound will be played over the TV's speaker to aid you in locating the recording on the cassette. If you cue the tape badly and the tape starts out in the middle of the file, don't worry; simply reposition the tape to the beginning. The transfer utility will sift patiently through the middle of a file, or even through garbage, until it finds what it's looking for.

When the transfer utility does find the beginning of a file, it will stop the recorder and print the file's name and type. You will be asked if you want to transfer this file. If you do, press the Y key. Otherwise press the N key. You will be prompted to prepare the cassette again.

As the file loads in, a block will blink in the upper-left corner of the screen. If there isn't enough memory to hold the whole file, or if there is an I/O Error, a message will be printed and the transfer terminated. You will then be invited to start the transfer utility over again or return to BASIC.

BASIC programs saved in non-ASCII form and machine language programs saved with the CSAVEM command are organized differently on disk than on tape. So when the tape file is fully loaded into memory, the transfer utility will automatically reformat the data as needed so that it will work correctly on disk. (BASIC programs saved in ASCII form, data files and machine language programs created by *EDTASM+* don't need any modifying.)

When the tape file is finished loading and reformatting is complete, a message to this effect will appear on the screen. You will now be asked for the name you want to give to the disk file. Enter any filespec that is valid in BASIC but *don't enclose it in quotes*. If you don't specify an extension, none will be used, and if you don't specify a drive number, the default will be used.

The transfer utility will next save the file onto disk. If an error occurs anywhere along the way, a message will be printed and you will be prompted again to enter the name for the disk file. So, if an error occurs while saving to disk, you won't have to reload the tape file all over again.

When the file has been successfully saved on disk, you will be asked if you would like to start the transfer utility anew. If you have more tape files to transfer, then press the Y key. Pressing the N key will return you to BASIC.

At any time the transfer utility is waiting for keyboard input, you may press BREAK to cancel the transfer in progress. You will then be asked if you would like to start over again or return to BASIC.

This utility will transfer any BASIC program, BASIC program saved in ASCII, machine language program created by CSAVEM, machine language program created by *EDTASM+*, or just about any data file to disk easily and accurately. It may not transfer protected programs or automatic execute loaders, however.

One interesting note: On cassette, there is no distinction between data files and BASIC programs saved in ASCII. That is, there is no way to tell whether a file was created with the command OPEN"O",-1"*filename*" or with the command CSAVE"*filename*",A. What does this mean? If you use the utility to transfer a BASIC program saved in ASCII, you will be told that the file is a data file, even though it is actually a BASIC program. There is no harm in this, however, because the disk file created will load correctly with the LOAD command, in spite of being labeled as a data file.

All files created by the Color Computer start out with a 15-byte block of data called a "header." The header contains the filename, the file's type, whether it is in ASCII or binary, and whether the tape recorder must be turned off and back on between loading each block of code. This leaves four bytes that are usually unused. The one exception is in machine language programs saved by the CSAVEM command. Here, the last four bytes contain the program's start and execute addresses. The transfer utility uses all of the information in a file's header to load it properly and reformat it if necessary. Some of this information is then transferred into the disk directory.

(Questions about this utility may be addressed to the author at 2054 Manning Avenue, Los Angeles, CA 90025. Please enclose an SASE for a response.) ☐

The listing: TPTODSK

```
                   00001 ********************************
                   00002 * TAPE TO DISK FILE TRANSFER *
                   00003 ********************************
                   00004 *
                   00005 *By:
                   00006 *  Roger Schrag
                   00007 *  2054 Manning Avenue
                   00008 *  Los Angeles, CA 90025
                   00009 *
                   00010 *
1000               00011         ORG     $1000   Low area of memory
1000 10CE 1000     00012 START   LDS     #$1000  Set up stack
1004 86   7E       00013         LDA     #$7E    Opcode for JMP nn
1006 8E   11B2     00014         LDX     #ERROR  Address to JMP to
1009 B7   018E     00015         STA     $18E    Patch into Basic's
100C BF   018F     00016         STX     $18F    Error vector
100F 8E   1460     00017         LDX     #BUFFER Start of free memory
1012 A6   84       00018 MLOOP   LDA     ,X      Read a byte
1014 43            00019         COMA            Complement register
1015 63   84       00020         COM     ,X      Complement RAM
1017 A1   84       00021         CMPA    ,X      Is the RAM good?
```

```
1019 26   04        00022         BNE   GOTMEM     If not,stop the test
101B 63   80        00023         COM   ,X+        Restore byte and go
101D 20   F3        00024         BRA   MLOOP      Check more bytes
101F 30   89 FF00   00025 GOTMEM  LEAX  -$100,X    Lower pointer some
1023 BF   143C      00026         STX   TOPMEM     Set top of memory
1026 10CE 1000      00027 BEGIN   LDS   #$1000     Reset stack pointer
102A 86   60        00028         LDA   #$60       Blank on the screen
102C 8E   0400      00029         LDX   #$400      Top of screen
102F 9F   88        00030         STX   $88        Place cursor there
1031 A7   80        00031 CLS     STA   ,X+        Clear the screen
1033 8C   0600      00032         CMPX  #$600      One byte at a time
1036 25   F9        00033         BLO   CLS        ...
1038 5F             00034         CLRB             Use ROM routine to
1039 BD   A99D      00035         JSR   $A99D      Activate tape AUDIO
103C 8E   128F      00036         LDX   #TITLE     Title message
103F BD   11F1      00037         JSR   PRINTM     Print the message
1042 BD   11F9      00038         JSR   INPUT      Wait for Enter key
1045 7F   0985      00039         CLR   $985       Shut off drives so
1048 7F   0986      00040         CLR   $986       They won't run endlessly
104B 7F   FF40      00041         CLR   $FF40      During cassette I/O
104E AD   9F A004   00042 GETHED  JSR   [$A004]    Locate new recording
1052 8E   1450      00043         LDX   #HEADER    Tell ROM to read data
1055 9F   7E        00044         STX   $7E        Into HEADER buffer
1057 AD   9F A006   00045         JSR   [$A006]    Read some data
105B 0D   7C        00046         TST   $7C        Was it a file header?
105D 26   EF        00047         BNE   GETHED     Try again if not
105F 0D   81        00048         TST   $81        Was there an IO error?
1061 26   EB        00049         BNE   GETHED     Try again if so
1063 BD   11DE      00050         JSR   MTROFF     Shut off tape motor
1066 8E   04A0      00051         LDX   #$4A0      Set cursor position
1069 9F   88        00052         STX   $88        At mid screen
106B 8E   12E1      00053         LDX   #TNAME     "Filename is..."
106E BD   11F1      00054         JSR   PRINTM     Print the message
1071 8E   1450      00055         LDX   #HEADER    Point to filename
1074 C6   08        00056         LDB   #$8        8 characters long
1076 A6   80        00057 PNAME   LDA   ,X+        Get character
1078 BD   11E7      00058         JSR   VIDEO      Print on screen
107B 5A             00059         DECB             Decrement counter
107C 26   F8        00060         BNE   PNAME      Print whole name
107E 8E   12F4      00061         LDX   #TTYPE     "It is a..."
1081 BD   11F1      00062         JSR   PRINTM     Print the message
1084 8E   1287      00063         LDX   #TTYPES    Table of types
1087 B6   1458      00064         LDA   HEADER+8   Get file's type
108A 81   02        00065         CMPA  #$2        Is it legal?
108C 23   02        00066         BLS   OKTYPE     Skip ahead if so
108E 86   03        00067         LDA   #$3        It's "Non standard"
1090 48             00068 OKTYPE  LSLA             Type times two
1091 AE   86        00069         LDX   A,X        Get addr off table
1093 BD   11F1      00070         JSR   PRINTM     Print the message
1096 8E   133D      00071         LDX   #XFERIT    "Transfer it?"
1099 BD   1224      00072         JSR   YESNO      Get yes or no
109C 26   88        00073         BNE   BEGIN      If no, try again
109E 8E   1460      00074         LDX   #BUFFER    Start of memory
10A1 20   05        00075         BRA   SYNC       Jump into load loop
10A3 7D   145A      00076 TLOAD   TST   HEADER+$0A Need to resyncronize?
10A6 27   0B        00077         BEQ   NOSYNC     Skip routine if not
10A8 34   10        00078 SYNC    PSHS  X          Save X
10AA BD   11DE      00079         JSR   MTROFF     Turn off tape motor
10AD AD   9F A004   00080         JSR   [$A004]    Resyncronize
10B1 35   10        00081         PULS  X          Restore X
10B3 9F   7E        00082 NOSYNC  STX   $7E        Tell ROM where to put data
10B5 AD   9F A006   00083         JSR   [$A006]    Load some data
10B9 C6   01        00084         LDB   #$1        Code for I/O ERROR
10BB 0D   81        00085         TST   $81        Was there an IO?
```

```
10BD 1026 00F1      00086        LBNE    ERROR    Branch if so
10C1 96   7C        00087        LDA     $7C      Check block's type
10C3 81   FF        00088        CMPA    #$FF     End of the file?
10C5 27   0F        00089        BEQ     TAPEND   Skip ahead if so
10C7 4A             00090        DECA             Valid data block?
10C8 1026 00E6      00091        LBNE    ERROR    I/O ERROR if not
10CC BC   143C      00092        CMPX    TOPMEM   Out of buffer space?
10CF 25   D2        00093        BLO     TLOAD    Loop back if not
10D1 C6   FF        00094        LDB     #$FF     Code for BUFFER FULL
10D3 7E   11B2      00095        JMP     ERROR    Cause the error
10D6 BF   143E      00096 TAPEND STX     EOF      Save the file's end
10D9 BD   11DE      00097        JSR     MTROFF   Shut off tape motor
10DC B6   1458      00098        LDA     HEADER+8 Get file's type
10DF 81   02        00099        CMPA    #$2      Was it M.L. program?
10E1 26   2F        00100        BNE     NOTML    Skip ahead if not
10E3 7D   145A      00101        TST     HEADER+$0A In CSAVEM form?
10E6 26   2A        00102        BNE     NOTML    Skip ahead if not
                    00103 *Tape files created by CSAVEM must be edited
                    00104 *before they will load properly from disk
10E8 30   0A        00105        LEAX    $0A,X    Change EOF to make
10EA BF   143E      00106        STX     EOF      File 10 bytes longer
10ED FC   145B      00107        LDD     HEADER+$0B Get EXEC address
10F0 ED   83        00108        STD     ,--X     Put it at very end
10F2 6F   82        00109        CLR     ,-X      Preceed EXEC address
10F4 6F   82        00110        CLR     ,-X      By two zeroes
10F6 86   FF        00111        LDA     #$FF     Preceed all that by
10F8 A7   82        00112        STA     ,-X      An $FF
10FA A6   1A        00113 FIX1   LDA     -6,X     Move the entire file
10FC A7   82        00114        STA     ,-X      Over five bytes. This
10FE 8C   1465      00115        CMPX    #BUFFER+5 Leaves five bytes
1101 22   F7        00116        BHI     FIX1     At the very beginning
```

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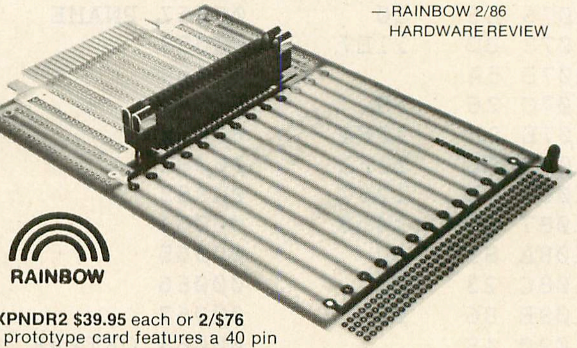

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```
1103 FC    145D      00117          LDD     HEADER+$0D Get START address
1106 ED    83        00118          STD     ,--X      Add it into file
1108 FC    143E      00119          LDD     EOF       Get length of file
110B 83    146A      00120          SUBD    #BUFFER+$0A Minus 10
110E ED    83        00121          STD     ,--X      Add this into file
1110 6F    82        00122          CLR     ,-X       Make first byte zero
1112 7D    1458      00123 NOTML    TST     HEADER+8 Is it Basic program?
1115 26    1D        00124          BNE     NOTBAS    Skip ahead if not
                     00125 *Non ASCII Basic prorams also must be edited
1117 BE    143E      00126          LDX     EOF       Change end of file
111A 30    03        00127          LEAX    3,X       To make the file
111C BF    143E      00128          STX     EOF       Three bytes longer
111F A6    1C        00129 FIX2     LDA     -4,X      Move entire file
1121 A7    82        00130          STA     ,-X       Over three bytes, so
1123 8C    1463      00131          CMPX    #BUFFER+3 The three extra bytes
1126 22    F7        00132          BHI     FIX2      Are at the beginning
1128 FC    143E      00133          LDD     EOF       Get length of file
112B 83    1463      00134          SUBD    #BUFFER+3 Minus three
112E ED    83        00135          STD     ,--X      Add it into file
1130 86    FF        00136          LDA     #$FF      Make very first byte
1132 A7    82        00137          STA     ,-X       Of file an $FF
1134 8E    0520      00138 NOTBAS   LDX     #$520     Set cursor position
1137 9F    88        00139          STX     $88       At mid screen
1139 8E    1353      00140          LDX     #LDCOMP   "Load is complete"
113C BD    11F1      00141          JSR     PRINTM    Print the message
113F 8E    1368      00142 RETRY    LDX     #DNAME    "Disk filename?"
1142 BD    11F1      00143          JSR     PRINTM    Print the message
1145 BD    11F9      00144          JSR     INPUT     Get the filename
1148 BE    1458      00145          LDX     HEADER+8 Get file's type
114B BF    0957      00146          STX     $957      Store it
114E B6    095A      00147          LDA     $95A      Get default drive #
1151 97    EB        00148          STA     $EB       Store it
1153 8E    094C      00149          LDX     #$94C     Clear out the
1156 86    20        00150          LDA     #$20      Filename storage
1158 A7    80        00151 BLANK    STA     ,X+       Area
115A 8C    0957      00152          CMPX    #$957     ...
115D 25    F9        00153          BLO     BLANK     ...
115F 8E    1440      00154          LDX     #INKEY    Name person entered
1162 C6    FF        00155          LDB     #$FF      Prepare B
1164 5C              00156 GETLEN   INCB              Get the length of
1165 6D    85        00157          TST     B,X       The person's entry
1167 26    FB        00158          BNE     GETLEN    Into B
1169 CE    1176      00159          LDU     #BACK     Put return address
116C 34    40        00160          PSHS    U         Onto stack
116E 6F    E2        00161          CLR     ,-S       Make space on stack
1170 CE    127B      00162          LDU     #DFNAME Use ROM routine to
1173 7E    126D      00163          JMP     USEROM    Prepare the filename
1176 86    4F        00164 BACK     LDA     #$4F      ASCII O for Output
1178 C6    01        00165          LDB     #$1       Use device #1 (disk)
117A CE    127F      00166          LDU     #DOPEN    Use ROM routine to
117D BD    126D      00167          JSR     USEROM    Open the file
1180 8E    1460      00168          LDX     #BUFFER Start of memory
1183 86    01        00169          LDA     #$1       Select output device
1185 97    6F        00170          STA     $6F       #1 (the disk file)
1187 A6    80        00171 DWRITE   LDA     ,X+       Get a byte
1189 34    10        00172          PSHS    X         Save X
118B AD    9F A002   00173          JSR     [$A002] Write it to file
118F 35    10        00174          PULS    X         Restore X
1191 BC    143E      00175          CMPX    EOF       More to write?
1194 25    F1        00176          BLO     DWRITE    Skip back if so
1196 CE    1283      00177          LDU     #DCLOSE Use ROM routine to
1199 BD    126D      00178          JSR     USEROM    Close the disk file
119C 8E    1379      00179          LDX     #ALDONE "Transfer complete"
```

```
119F BD   11F1     00180 FINISH  JSR   PRINTM     Print the message
11A2 8E   13C4     00181         LDX   #AGAIN     "Start program anew?"
11A5 BD   1224     00182         JSR   YESNO      Get yes or no
11A8 1027 FE7A     00183         LBEQ  BEGIN      Restart if yes
11AC 0F   71       00184         CLR   $71        Make it a cold start
11AE 6E   9F FFFE  00185         JMP   [$FFFE]    Reinitialize system
                   00186 *Control goes to ERROR when any error occurs
11B2 34   04       00187 ERROR   PSHS  B          Save error code
11B4 CE   1283     00188         LDU   #DCLOSE    Use ROM routine to
11B7 BD   126D     00189         JSR   USEROM     Close the disk file
11BA 8D   22       00190         BSR   MTROFF     Shut off tape motor
11BC E6   E4       00191         LDB   ,S         Get error code
11BE CE   13D9     00192         LDU   #ERRS      Table of error codes
11C1 AE   C1       00193 GETERR  LDX   ,U++       Get addr of message
11C3 E1   C4       00194         CMPB  ,U         Compare codes
11C5 27   04       00195         BEQ   GOTERR     Skip ahead if match
11C7 6D   C0       00196         TST   ,U+        End of table?
11C9 26   F6       00197         BNE   GETERR     Skip back if not
11CB BD   11F1     00198 GOTERR  JSR   PRINTM     Print error message
11CE 35   04       00199         PULS  B          Restore error code
11D0 8E   1399     00200         LDX   #CANCEL    "Function cancelled"
11D3 C1   01       00201         CMPB  #$1        Cancel procedure if
11D5 27   C8       00202         BEQ   FINISH     Error occurred while
11D7 C1   FF       00203         CMPB  #$FF       Loading the tape file
11D9 27   C4       00204         BEQ   FINISH     But if file loaded OK,
11DB 7E   113F     00205         JMP   RETRY      Then ask again for filename
11DE B6   FF21     00206 MTROFF  LDA   $FF21      Shut off tape motor
11E1 84   F7       00207         ANDA  #$F7       Reset the bit in PIA
11E3 B7   FF21     00208         STA   $FF21      Store it in PIA
11E6 39            00209 RETURN  RTS              Return
11E7 34   16       00210 VIDEO   PSHS  X,D        Save X and D
11E9 0F   6F       00211         CLR   $6F        Device #0 (screen)
11EB AD   9F A002  00212         JSR   [$A002]    Print character
11EF 35   96       00213         PULS  D,X,PC     Restore and return
11F1 A6   80       00214 PRINTM  LDA   ,X+        Get a byte of message
11F3 27   F1       00215         BEQ   RETURN     All done if a zero
11F5 8D   F0       00216         BSR   VIDEO      Otherwise print it
11F7 20   F8       00217         BRA   PRINTM     Loop back for more
11F9 8E   1440     00218 INPUT   LDX   #INKEY     Start of inkey buffer
11FC 8D   42       00219 IN1     BSR   GETKEY     Get a key
11FE 81   0D       00220         CMPA  #$0D       Enter key?
1200 26   04       00221         BNE   IN2        Skip ahead if not
1202 6F   84       00222         CLR   ,X         Put 0 at end of data
1204 20   E1       00223         BRA   VIDEO      Print CR and return
1206 81   08       00224 IN2     CMPA  #$8        Backspace?
1208 26   0B       00225         BNE   IN3        Skip ahead if not
120A 8C   1440     00226         CMPX  #INKEY     Anything to backspace over?
120D 27   ED       00227         BEQ   IN1        Ignore it if not
120F 6F   82       00228         CLR   ,-X        Erase char from buffer
1211 8D   D4       00229         BSR   VIDEO      Erase it from screen
1213 20   E7       00230         BRA   IN1        Branch back for more
1215 81   20       00231 IN3     CMPA  #$20       Non-alphanumeric?
1217 25   E3       00232         BLO   IN1        Ignore it if so
1219 8C   144F     00233         CMPX  #INKEY+$0F Is buffer full?
121C 27   DE       00234         BEQ   IN1        Ignore it if so
121E A7   80       00235         STA   ,X+        Put char in buffer
1220 8D   C5       00236         BSR   VIDEO      Print it on screen
1222 20   D8       00237         BRA   IN1        Branch back for more
1224 BD   11F1     00238 YESNO   JSR   PRINTM     Print prompt
1227 8D   17       00239 YN1     BSR   GETKEY     Get key
1229 81   4E       00240         CMPA  #$4E       Is it "N"?
122B 26   08       00241         BNE   YN2        Skip ahead if not
122D 8E   1438     00242         LDX   #NO        "No"
```

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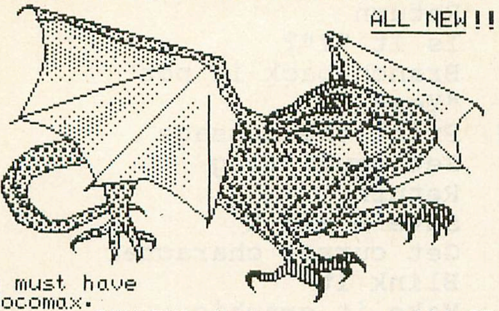

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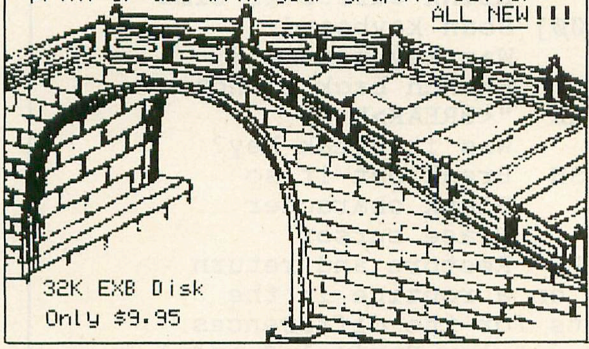

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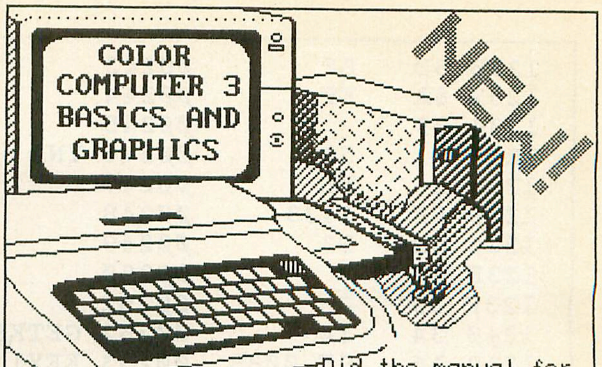

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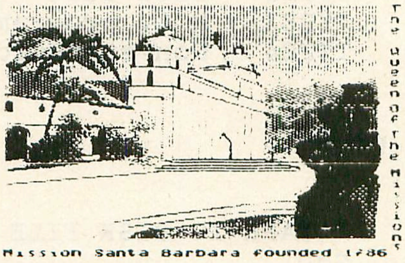
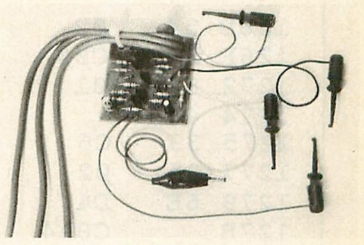


The only color Okimate 20 Screen Dump Now Available for the CoCo.

(Price subject to change)

DOUBLE DRIVER II



Finally a monitor driver for the Color Computer II that lets you use a monochrome and a color monitor simultaneously. We're proud of this new driver. The six transister circuit provides optimal signal mixing and signal gain. Excellent monochrome output and better quality resolution in the color ouput than any driver we have seen. Audio output also. Fits all models of the Color Computer II. $29.95.

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A QUALITY PIECE OF HARDWARE

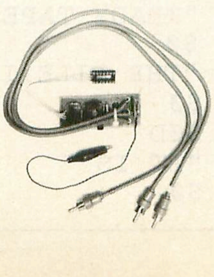
COCO SWITCHER

The CoCo Switcher allows you to hook up three peripherals to your RS-232 jack. Connect your modem, printer and any other RS-232 compatible peripheral to the CoCo Switcher. An LED on the CoCo Switcher shows if your computer is on or off at a glance, The LED flickers when transmitting or receiving data.

$39.95 plus $2.00 shipping and handling

DOUBLE DRIVER I

The BEST monitor driver available. Color composite, monochrome and audio output. For original CoCo D, E and F boards. $24.95.



MONO II

Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

$24.95.

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```
1230 8D   BF       00243        BSR    PRINTM  Print the message
1232 8A   FF       00244        ORA    #$FF    Reset equal flag
1234 39            00245        RTS            Return
1235 81   59       00246 YN2    CMPA   #$59    Is it "Y"?
1237 26   EE       00247        BNE    YN1     Branch back if not
1239 8E   1433     00248        LDX    #YES    "Yes"
123C 8D   B3       00249        BSR    PRINTM  Print the message
123E 4F            00250        CLRA           Set equal flag
123F 39            00251        RTS            Return
1240 34   14       00252 GETKEY PSHS   B,X     Save B and X
1242 A6   9F 0088  00253 KEY1   LDA    [$88]   Get cursor character
1246 8B   10       00254        ADDA   #$10    Blink it
1248 8A   8F       00255        ORA    #$8F    Make it graphic
124A A7   9F 0088  00256        STA    [$88]   Print new cursor
124E 8E   0080     00257        LDX    #$80    Loop counter
1251 30   1F       00258 KEY2   LEAX   -1,X    Decrement counter
1253 27   ED       00259        BEQ    KEY1    Blink cursor if time
1255 AD   9F A000  00260        JSR    [$A000] Scan keyboard
1259 4D            00261        TSTA           Was key pressed?
125A 27   F5       00262        BEQ    KEY2    Branch back if not
125C 8E   13BB     00263        LDX    #BREAK  "<BREAK>"
125F 81   03       00264        CMPA   #$3     Was it Break key?
1261 1027 FF3A     00265        LBEQ   FINISH  Break out if so
1265 C6   60       00266        LDB    #$60    Blank character
1267 E7   9F 0088  00267        STB    [$88]   Erase cursor
126B 35   94       00268        PULS   X,B,PC  Restore and return
                   00269 *Routine below calls on a routine in the
                   00270 *Disk ROM. It accounts for the differences
                   00271 *between Disk Extended Color Basic 1.0 and 1.1
126D 34   02       00272 USEROM PSHS   A       Save A
126F B6   C00      00273        LDA    $C005   Check which version ROM
1272 84   01       00274        ANDA   #$1     Zero=1.0  One=1.1
1274 48            00275        LSLA           Zero=1.0  Two=1.1
1275 33   C6       00276        LEAU   A,U     Increment U if ROM 1.1
1277 35   02       00277        PULS   A       Restore A
1279 6E   D4       00278        JMP    [,U]    Use ROM routine
127B      C8A4     00279 DFNAME FDB    $C8A4   1.0 Process filename
127D      C952     00280        FDB    $C952   1.1 Process filename
127F      C468     00281 DOPEN  FDB    $C468   1.0 Open disk file
1281      C48D     00282        FDB    $C48D   1.1 Open disk file
1283      CA3B     00283 DCLOSE FDB    $CA3B   1.0 Close disk file
1285      CAE9     00284        FDB    $CAE9   1.1 Close disk file
                   00285 *Tape file types
1287      12FC     00286 TTYPES FDB    TYPE1   Basic program
1289      130C     00287        FDB    TYPE2   Data file
128B      1318     00288        FDB    TYPE3   M.L. program
128D      1328     00289        FDB    TYPE4   Non standard
                   00290 *
                   00291 *
                   00292 *Messages and prompts
                   00293 *
                   00294 *
128F      20       00295 TITLE  FCC    " TAPE TO DISK FILE TRANSFER"
12AA      0D       00296        FCB    $0D
12AB      20       00297        FCC    " ==========================="
12C6      0D0D     00298        FDB    $0D0D
12C8      52       00299        FCC    "READY TAPE & HIT ENTER? "
12E0      00       00300        FCB    $0
12E1      54       00301 TNAME  FCC    "THE FILE IS NAMED "
12F3      00       00302        FCB    $0
12F4      0D       00303 TTYPE  FCB    $0D
12F5      49       00304        FCC    "IT IS "
12FB      00       00305        FCB    $0
```

XTEAM & OS-9

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CoCo 3 SUPPORTED

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OS-9 Communications program.

- Menu oriented
- Upload/download. Ascii or XMODEM protocol
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Creates a menu driven environment for OS-9.

- Create your own menus
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OS-9 hi-res screen

- 51/64/85 chars per line
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OS-9 calculator
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- Works with standard text screen, XSCREEN, WORDPAK, or O-PAK
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Mail merge capabilities for XWORD

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OS-9 spelling checker, with 20000 and 40000 word dictionaries

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This sales-based accounting package is designed for the non-accounting oriented businessman. It also contains the flexibility for the accounting oriented user to set up a double entry journal with an almost unlimited chart of accounts. Includes Sales Entry, transaction driven Accounts Receivable and Accounts Payable, Journal Entry, Payroll Disbursement, and Record Maintenance programs. System outputs include Balance Sheet, Income Statement, Customer and Vendor status Reports, Accounts Receivable and Payable Aging Reports, Check Register, Sales Reports, Account Status Lists, and a Journal Posting List. **$79.95**

INVENTORY CONTROL/SALES ANALYSIS

This module is designed to handle inventory control, with user defined product codes, and produce a detailed analysis of the business' sales and the sales force. One may enter/update inventory data, enter sales, run five sales analysis reports, run five inventory reports, set up product codes, enter / update salesman records, and update the SBAP inventory. **$59.95**

PAYROLL

Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware. **$59.95**

These programs are user friendly and menu driven. Sample transactions are included. Each package features a hi-res screen. Each requires a printer, a minimum of 32k and at least 1 disk drive.

ACCOUNTS RECEIVABLE

Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package. **$59.95**

ACCOUNTS PAYABLE

Designed for the maintenance of vendor and A/P invoice files. The system prints checks, voids checks, cancels checks, deletes cancelled checks, and deletes paid A/P invoices. The user can run a Vendor List, Vendor Status report, Vendor Aged report, and an A/P Check Register. This package can be used either as a standalone A/P system or can be integrated with the Small Business Accounting Package. **$59.95**

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```
12FC     41       00306 TYPE1    FCC     "A BASIC PROGRAM"
130B     00       00307          FCB     $0
130C     41       00308 TYPE2    FCC     "A DATA FILE"
1317     00       00309          FCB     $0
1318     41       00310 TYPE3    FCC     "AN M.L. PROGRAM"
1327     00       00311          FCB     $0
1328     49       00312 TYPE4    FCC     "IN NON STANDARD FORM"
133C     00       00313          FCB     $0
133D     0D       00314 XFERIT   FCB     $0D
133E     54       00315          FCC     "TRANSFER THIS FILE? "
1352     00       00316          FCB     $0
1353     54       00317 LDCOMP   FCC     "THE LOAD IS COMPLETE"
1367     00       00318          FCB     $0
1368     0D       00319 DNAME    FCB     $0D
1369     44       00320          FCC     "DISK FILENAME? "
1378     00       00321          FCB     $0
1379     0D       00322 ALDONE   FCB     $0D
137A     54       00323          FCC     "THE FILE TRANSFER IS COMPLETE"
1397     0D00     00324          FDB     $0D00
1399     0D       00325 CANCEL   FCB     $0D
139A     54       00326          FCC     "THE PROCEDURE HAS BEEN CANCELLED"
13BA     00       00327          FCB     $0
13BB     3C       00328 BREAK    FCC     "<BREAK>"
13C2     0D00     00329          FDB     $0D00
13C4     53       00330 AGAIN    FCC     "START PROGRAM ANEW? "
13D8     00       00331          FCB     $0
13D9     13E8     00332 ERRS     FDB     E1
13DB     38       00333          FCB     $38
13DC     13F8     00334          FDB     E2
13DE     3C       00335          FCB     $3C
13DF     1410     00336          FDB     E3
13E1     3E       00337          FCB     $3E
13E2     141D     00338          FDB     E4
13E4     FF       00339          FCB     $FF
13E5     1429     00340          FDB     E5
13E7     00       00341          FCB     $00
13E8     44       00342 E1       FCC     "DISK SPACE FULL"
13F7     00       00343          FCB     $0
13F8     44       00344 E2       FCC     "DISK IS WRITE PROTECTED"
140F     00       00345          FCB     $0
1410     42       00346 E3       FCC     "BAD FILENAME"
141C     00       00347          FCB     $0
141D     42       00348 E4       FCC     "BUFFER FULL"
1428     00       00349          FCB     $0
1429     49       00350 E5       FCC     "I/O ERROR"
1432     00       00351          FCB     $0
1433     59       00352 YES      FCC     "YES"
1436     0D00     00353          FDB     $0D00
1438     4E       00354 NO       FCC     "NO"
143A     0D00     00355          FDB     $0D00
                  00356 *
                  00357 *
                  00358 *Variables and pointers
                  00359 *
                  00360 *
143C     0000     00361 TOPMEM   FDB     $0      End of system's memory
143E     0000     00362 EOF      FDB     $0      End of tape file
1440              00363 INKEY    RMB     $10     Space for input buffer
1450              00364 HEADER   RMB     $10     Space for tape file header
1460              00365 BUFFER   *All of the rest is for the BUFFER
         1000     00366          END     START   Execution begins at START

00000 TOTAL ERRORS
```

Prospect, Kentucky

Vol.2 No.3

Writer: Cray Augsburg

The RAINBOWfest Reporter

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Color Computer 3 Is Top Dog at Princeton RAINBOWfest

It was a cool evening in Princeton, New Jersey, when literally thousands descended upon the local Hyatt Regency hotel. "What's going on?" was heard from several passers-by. What else?? It was the 12th RAINBOWfest. It was the premier show for the new Color Computer 3. At 7, Friday evening, the vendors were ready and the doors were opened.

There was a mad dash for the Radio Shack booth; everyone wanted to get a glimpse of the new machine. For many, it was the first look at the CoCo 3. As the night went on, it became a common sight to see people purchasing their CoCo 3s, tucking them under their arms, and heading off to their hotel rooms to see what they needed to do to the hotel's TVs to make their CoCo 3 work. It was somewhat reminiscent of the "Cabbage Patch" craze. Later, after an hour with the new machine, those people would reappear in the exhibit hall to see what other things they could find.

To put it in simpler terms, the Color Computer 3 was the hit of the show. Few could speak of anything else. Questions and rumors were flying. To offset this, the show was attended by Barry Thompson, Mark Siegel, Fran McGehee and Srini Vasan. These representatives of Tandy Corporation did their best to answer all the questions people had. Barry Thompson and Mark Siegel were also panel members for the roundtable discussion on the CoCo 3.

People appeared in the exhibit hall in waves. Just as you started to move down an aisle, it would crowd up and you would be blocked.

Several groups of people gathered outside the exhibit hall just so they could talk with each other.

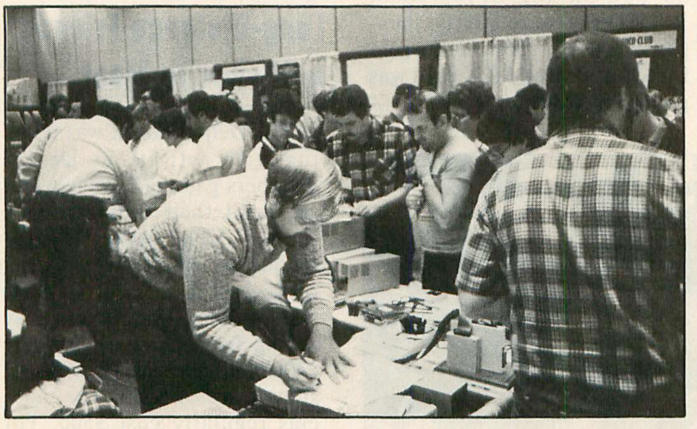
Around 500 Color Computer 3s (a sell-out) were taken home by the crowd at RAINBOWfest Princeton 1986.

While excitement about the CoCo 3 was high, several "outside" discussions turned to a more serious matter; how best to support the enhancements of the new machine. A great topic was the exchange of technical information. (As more and more producers of CoCo software get their new machines, it is becoming quite apparent the support is there. We are already seeing new products on the market designed to take full advantage of the CoCo 3.)

It appears that many people are taking heed of CoCo Community Breakfast keynote speaker Dale Lear's charge that we move forward with CoCo 3 and be innovative.

We should see a great deal more on the CoCo 3 at the next RAINBOWfest which is scheduled for April 10-12, 1987 in Chicago.

Owl-Ware Has Everything for the CoCo Hacker



Greg Wozricki of Owlware finalizes another sale.

Owl-Ware was out in force selling everything from AC power centers to complete hard drive systems. Prices for the hard drive systems, which included *Winchester BASIC*, varied from $599 for 10 Meg to $829 for 30 Meg. Owl-Ware was also selling full-height, double-sided drives for $89. They also sold two Tandy 1200s with hard drives for $895 each.

About the RAINBOWfest, Tom Roginski, owner of Owl-Ware, said, "These are nice, honest people. Very good to work with. Generally, I think everyone is enjoying the show."

In addition to drives, Owl-Ware had a full line of components and computers.

When the show ended Sunday, Tom demonstrated a little hardware device Owl-Ware had been working on. The Super I/O Board is a cartridge-like add-on for the CoCo 2 and CoCo 3, which includes two serial ports, a parallel port and a real-time clock as well as extending the cartridge port for the disk controller. It is designed to work under OS-9. It should be a real boon for OS-9 hackers.

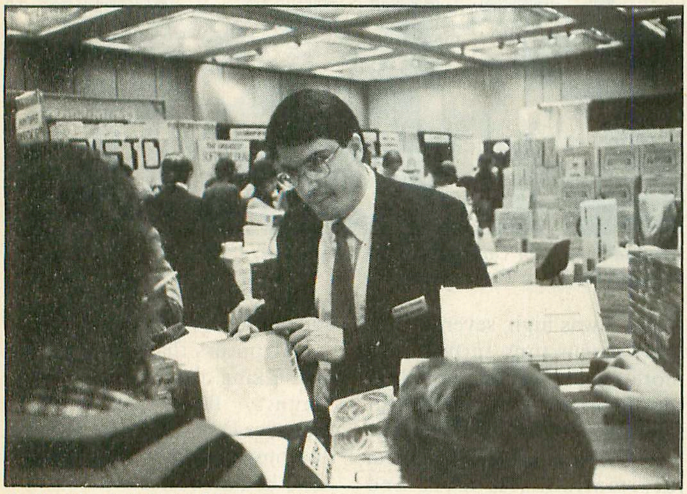
Computer Plus — Great Bargains on Tandy Equipment

Computer Plus occupied two booths at the Princeton 'fest. The hot item was the Color Computer 3 selling for $169. Computer Plus sold out of their CoCo 3s by noon on Saturday. In addition, several people took advantage of the opportunity to buy the DMP-105 for $110 and the DMP-130 for $210. Another hot item was the FD-501 disk drive system, which was selling for $170. Fran Purcell, owner of Computer Plus, said, "The crowd seems larger than usual. Financially this is the best RAINBOW*fest* we've ever been to."

Radio Shack — Consumer Division Takes Over Booth Management

At the Radio Shack booth, we spoke with District Manager Hank Boyer. That is, we tried to speak with Hank, but every time the conversation started, he would have to run off to write up another sale. People pressed around the Radio Shack booth watching the CoCo 3 and CM-8 do their thing. Radio Shack was selling the CoCo 3 for $199 and taking prepaid orders for the CM-8 for $259.95. Other bargains included the FD-501 drive system for $170, 64K CoCo 2s for $85, 16K Standard CoCo 2s for $49, *Deskmate* for $59.95 and the Color Mouse for $29.95. When the Show opened Sunday, Radio Shack dropped the price of the CoCo 3 to $179 and shortly sold out. Hank told us, "The Tandy Business Products Division used to run the Radio Shack booth at the RAINBOWfests. Now, the Consumer Division has taken over the responsibility and we hope to be doing many new things in future shows."

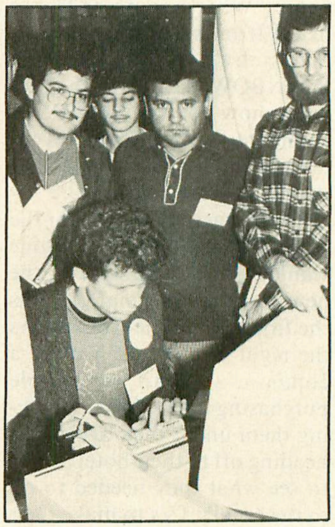
RAINBOW Publisher Lonnie Falk (left) thanks CoCo Community Breakfast speaker Dale Lear.



Radio Shack District Manager Hank Boyer responds to a question.

OS-9 Users Group — More Popular Than Ever

Several heavy discussions were started at the OS-9 Users Group booth. In between signing up new members, Brian Lantz, president of the Users Group, said, "There appears to be a high interest in OS-9. We have taken twice as many memberships as we have at previous RAINBOWfests." At the OS-9 Users Group breakfast Sunday morning, Esther Puckett, wife of Dale Puckett, was unanimously voted in as a lifetime honorary member.



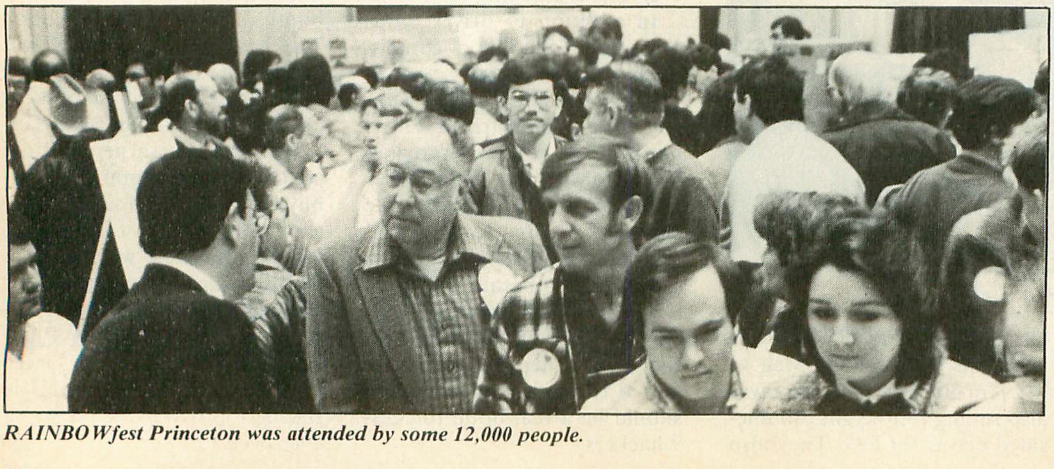
In less formal attire, OS-9 expert Dale Lear goes online with Delphi.

Disto's Many Marvels Include CDOS 4.0

At the Disto booth we spoke with Chris Roshon, who appeared to have taken over sales since Tony DiStefano was always caught up in explaining his "many marvels" to the ever-present crowd. Chris said, "We are enjoying the show very much. We especially liked the round-table discussion. It's good to meet the people who control the CoCo's destiny in Fort Worth."

On a nearby table, *CoCo Max* was running on a CoCo 2 and people were loading full *CoCo Max* pictures in a flash. Tony had done it again. In a system running CDOS 4.0, it is possible to load *CoCo Max* files from the Disto RAMDisk instantly.

Disto was selling the controller for $80 and the Display 80 add-on for $110. Also, RAMDisks were pretty inexpensive, as the 256K model sold for $90 and a full 512K card was going for $130.

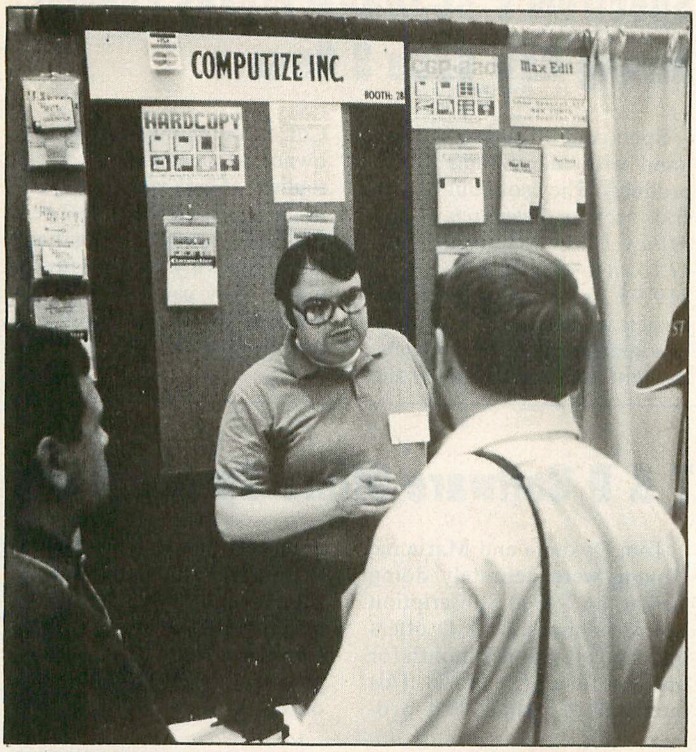


RAINBOWfest Princeton was attended by some 12,000 people.

Delphi Gives Long-Distance Friends a Chance to Meet

The Delphi booth was teeming with activity as Delphi members gathered to meet and see what their online friends looked like. While Marty Goodman was busy showing off several features of Delphi's system, Dick Ellisco was busy selling Telenetics Pony Express 2400 baud modems for a special show price of $349. The modems regularly cost $500. For several people, it was quite a thrill to see Marty accessing Delphi at 2400 baud. John Gibney of Delphi said, "We are letting people perceive the full value of 2400 baud operation."

Computize: *Graphicom* Selling Well



Bruce Farrington of Computize discusses CoCo 3 compatibility with RAINBOWfest attendees.

At the Computize booth, workers were busy selling *Graphicom* and *Graphicom Part II.* The reason for high sales on these products is that *CoCo Max* is incompatible with the CoCo 3. People seemed to have CoCo 3 on their minds and wanted software that would work on their new, as well as their old machines.

Ken Klosinski of Computize said, "This is the best show so far for us." In addition to *Graphicom* sales, Computize did well selling digitizers and 'Y' cables. The biggest item at this booth was the *Hardcopy* printer utility.

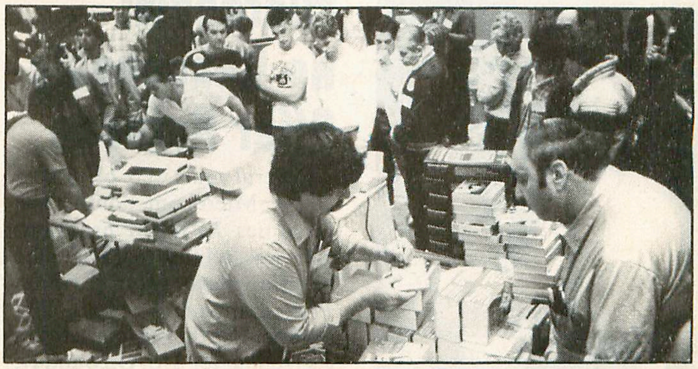
Southwestern Digital Has Show-End Blow Out Sale

Hot items at the Southwestern Digital booth were the Drive 0 for $95, and serial/parallel converters. Southwestern had a show-end blowout of drive systems, as well, with Drive 0 and 1 combo systems complete with controller going for an unbelievably low $140. Also, complete Drive 0 systems were selling for $85.

Microworld: Business Booming — Only Vendors to Offer CM-8 Monitors at RAINBOWfest

The two booths occupied by Microworld were crammed with Radio Shack hardware and software. They completely sold out their 200 CoCo 3s at $169. Other items included the Radio Shack Drive 0s for $169 and Multi-Pak Interfaces for $75 apiece. Microworld was also offering Deluxe RS-232 Paks for a mere $25. Being an authorized Radio Shack Repair Center helped, too, as Microworld is able to supply the required Multi-Pak fix for the CoCo 3.

Perhaps one of the highest points in the exhibit hall came when Microworld was able to announce they had several new CM-8 monitors for sale. At a price of $275 each, they sold the special shipment of 10 in less than 15 minutes. Being first in line really helped at this booth. Richard Kromer, owner of Microworld commented, "We've done a world of business this Saturday alone."



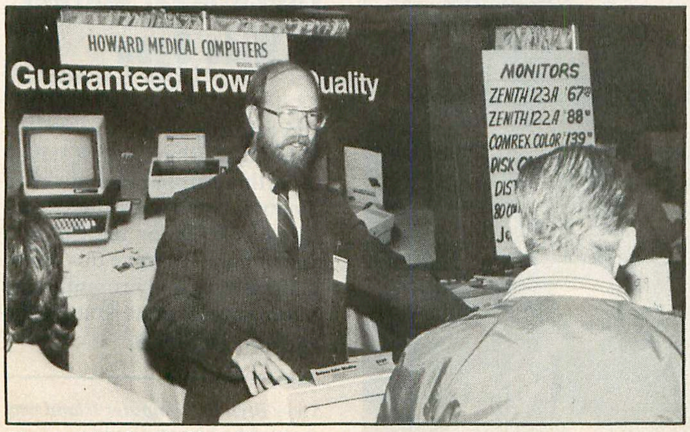
CoCo 3s were a popular item at the Microworld booth.

Diecom Plans to Support CoCo 3

While fewer software houses were at this RAINBOWfest than at previous 'fests, Diecom was there in full force. Two new programs by David Dies, president and programmer for Diecom, were available. *Gates of Delirium*, a fantasy role-playing game was selling for $31.95. Also, *Bouncing Boulders*, a fast-paced, arcade-style game, sold at $23.95.

Special show prices were also in effect for *Gantelet*, *Wrestle Maniac* and *Marble Maze*, which were being sold for $23.95. While the programs were not compatible with the CoCo 3, David Dies assured us that Diecom will fully support the new machine. To prove this point, they were allowing exchanges for up to three weeks for upgrades of their programs to CoCo 3 versions. David also told us to "look for newer things in the future which will take full advantage of the machine's enhanced capabilities."

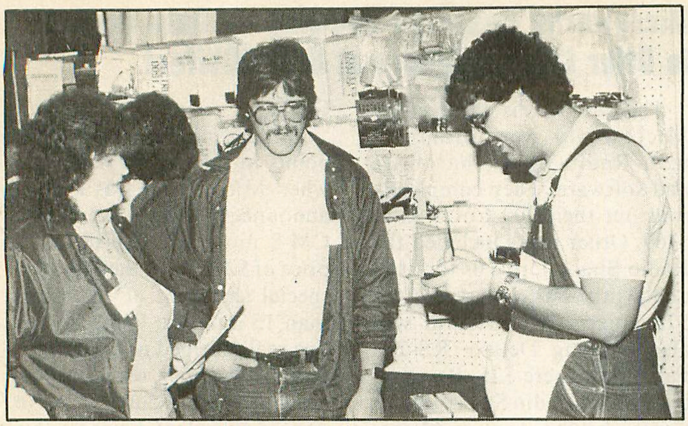
Howard Medical Has a Hit With Monochrome Monitors



Howard Medical's Chris Hawks.

Howard Medical was quite busy selling monochrome monitors from $67.50. Another big seller was the dual mode Epson LX-80 printer for $199. Ross Litton, manager of Howard Medical, told us, "The CoCo 3 is definitely the high point of this show, but there seems to be some confusion about the CoCo 2s and CoCo 3s and which monitors work with them. Once this is cleared up, sales will be even better." In any case, picking up a Comrex color monitor for $139 wasn't too bad a deal, at all!

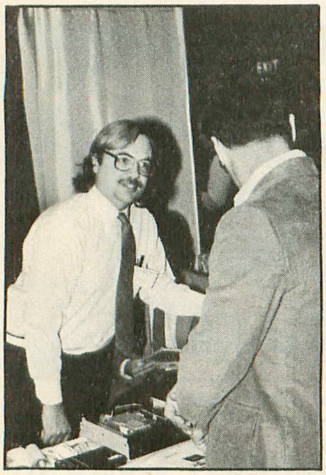
A CoCo fan sports a "No Commodores" T-shirt.



Spectrum Projects' Paul Rosen (right) wraps up a sale.

Spectrum's *CC3DRAW* Proves Popular Among New CoCo 3 Owners

Spectrum Projects was on hand with all of their CoCo products. They sold out of several, such as *Telepatch II* and *Mikey-Dial*. Spectrum's new *CC3DRAW* was a big hit at $19.95 as the new CoCo 3 owners wanted to get it for their new machines. Asked what he thought the future held for the CoCo Community, Bob Rosen, owner of Spectrum Projects, replied, "There is definitely life in the CoCo market. I feel people have been holding back since the July 30 announcement. They came here to see and buy the CoCo 3 and now they want software."



J & M's Terry Johnson.

J & M Systems Sees Future in New Machine

J & M Systems was selling its JFD-EC disk controller for $49.95. This was a special show price, down from $75. In addition, they were quite busy showing off a pretty, little hard drive. According to Terry Johnson, "There is lots of room in the CoCo market for hard drives, especially with the upcoming OS-9 on the CoCo 3. Basically, we are impressed with the amount of interest in the CoCo 3. We are using this show to decide what we will be doing for the new machine in the future."

Public Domain Software Makes 'fest Debut

Don Johnson of Public Domain Software told us, "This is our first RAINBOWfest and I like it. The crowd enabled us to let people know who we are." *Public Domain* was selling disks filled with *PD* software for $5 apiece or $99 for the complete library of 27 disks. The normal rate is $10 per disk.

Microcom: No Reasonable Offer Refused

Several items were being sold at the Microcom booth. The Intronics EPROM programmer was selling for $137, the new Supplement to *500 Pokes, Peeks and Execs* was being sold for $9, while the original edition was selling for $15. On Sunday, Microcom announced that no reasonable offer on their products would be refused!

HDS Does Well With MS-DOS, Too

Kevin Franciotti, who was manning the Hard Drive Specialists booth, feels some software vendors were missing out by not attending the Princeton show. In addition to their controller and CoCo disk drive sales, HDS sold quite a few of their offerings in the MS-DOS line.

T & D Software Offers Special Deals

Tom Dykema and Marianne Hoving were definitely doing well at the T & D Subscription Software booth. T & D offers one tape or disk per month for one year for a price of $70. This means more than 120 programs. At the RAINBOWfest, they were offering a special show deal of a one year's subscription for $60 plus four tapes free. Needless to say, several people were taking advantage of this offer.

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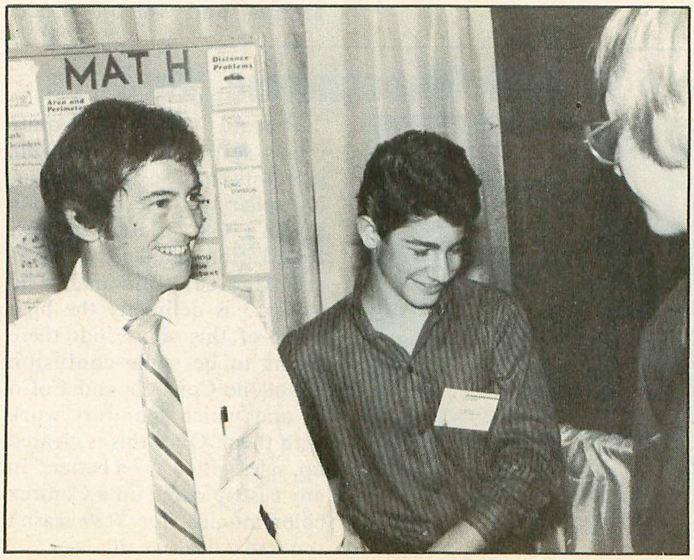
CONTAINING OVER 120 QUALITY PROGRAMS!
RAINBOWFEST SPECIAL
Sign up for a year now to save $10. and receive 4 free
es of your choice!
60. Disk or Tape

T & D's Tom and Marianne are now Mr. and Mrs. Dykema; they were married in November!



Computer Island: Educational Market Is Wide Open

Steve Blyn, a RAINBOW Contributing Editor, was at his Computer Island booth selling everything from blank disks to T-shirts. Steve says the educational market for the CoCo is wide open. To prove this point, Computer Island promptly sold out of several of its educational software products.

Steve Blyn of Computer Island was assisted by his son David.

ADOS a Big Seller at Spectrosystems Booth

In the Spectrosystems booth, owner Art Flexser was on hand selling copies of his ADOS with config utilities and documentation for $25. He was also selling *Peeper*, a program tracer, complete with source listing for $25. Art said, "People here are looking for CoCo 3 stuff. While ADOS doesn't entirely work on the CoCo 3, most features do work and I hope to be releasing a version for the CoCo 3 soon."

Mercer County CoCo Club — Raffle Mania

The Mercer County CoCo Club was selling RAINBOWfest T-shirts as well as raffle tickets. The club held four raffles for 30 disks each and a Sunday raffle for a new CoCo 3. Ed Whitman said, "I'm here to see the CoCo 3 and be involved in the excitement around it. It really is great to meet and talk with the people who work with the new machines."

At Saturday evening's Color Computer 3 round-table discussion, the panel featured (l-r, above) Mark Siegel and Barry Thompson of Tandy, RAINBOW's Lonnie Falk and independent software developers Steve Bjork and Dale Lear.

CompuServe Offers Free Life-Time Subscriptions

The CompuServe booth was filled with people. CompuServe's Wayne Day was offering free lifetime subscriptions along with $15 free credit for system use. Mike Ward, who was selling copies of his famous *Mikeyterm*, said, "It appears to be much more frantic than previous RAINBOWfests!"

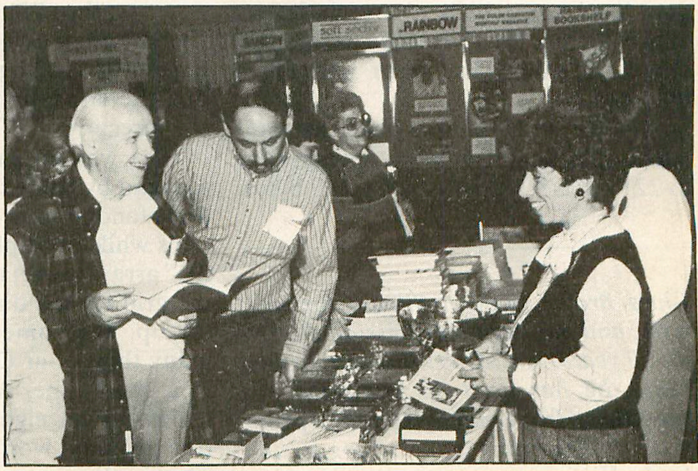
CoCo 3 Undergoes Implant Surgery

RAINBOW and Delphi regular Martin H. Goodman, M.D., "operates" on a CoCo 3.

While several onlookers watched with great interest, Marty Goodman dissected Art Flexser's newly purchased CoCo 3. The reason for the operation was to install a socket for the ROM chip internal to the CoCo 3. Art seemed to be pacing the floor, much as an expectant father would, as Marty carefully explained each step of the procedure. The operation was a success and Art became one of the first people to own a CoCo 3 with a socketed ROM chip.

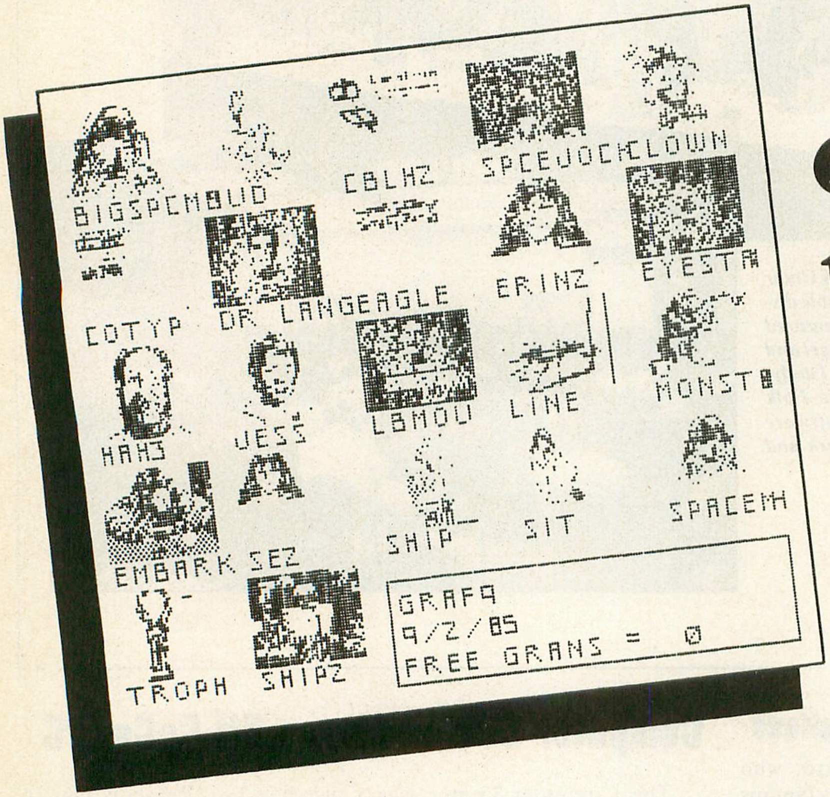
Computer Center Shows Off CoCo/PC

The Computer Center was busy selling slimline Drive 1 upgrades for $89.95 and single full-height drives complete with case and power supply for $74.95. However, according to head technician Logan Ward, they were doing quite a bit of EPROM burning as well. They burned several prepurchased copies of ADOS into EPROMs for customers for only $12.95, which included the cost of the EPROM. When Logan wasn't wearing his "Rainbow hair"(a multi-hued wig), he was busy showing off his CoCo/PC. The CoCo/PC is a CoCo 2 with two slimline drives, disk controller and *CoCo Max* all packed into an IBM PC case. To power the system, Logan wired in a 130-watt IBM power supply. The system has also been modified to use switchable composite video as well as an inboard audio amp and lap keyboard.



Falsoft General Manager Patricia Hirsch welcomes visitors to the RAINBOW booth.

Generate a graphic printout directory of your picture disks



Get the Picture

By Chris W. Brown

While amazingly efficient, those eight-character filenames leave a lot to be desired when it comes to graphic images. This is especially true if you are as lazy as I am and file seven progressive images of a dogwood blossom as `D1`, `D2`, `D3`, etc. I used to find myself loading in a program to scan each picture on a disk, then, once I found the image I wanted, loading in another program to use that picture. Those days are over. Now I have *GRADIR*, which is my six-letter abbreviation for "Graphic Graphics Directory Image Processor and Filer Program."

GRADIR is a BASIC program that can take a disk full of graphics images (up to 22 `PMODE 4` screens, each 6,143 bytes long) and produce, on one screen, a complete *graphic* directory of all the images on the disk. In a very reduced rendition, every picture stored on a disk is shown, complete with its filename, on one `PMODE 4` screen. As small as the images are, they are still easily recognizable. A photographer might compare one of *GRADIR*'s screens to a contact print of a roll of 35 mm film. It's very handy for selecting images and filing.

This program is simple to use. Load *GRADIR*, then `PCLEAR8` before you run. The program uses the first four `PMODE4` pages for loading graphics from disk and the last four pages for assembling the directory.

First, you are greeted with a request to stand by while the program initiates. The standby lasts only a couple of seconds while the alphanumeric and "long file" arrays are set up. During initiation, the grid for the directory screen is also set up. It's sometimes amazing how many things our CoCo can accomplish in a short time. After set up, you are asked for an eight-character filename (the program won't take a longer one). This is the name of the disk you are cataloging and will be used to label and save the graphics directory created by the program.

Then you are asked for a date (any format), which will also be used to label the finished directory. After you have entered the date, the program prompts you to put the disk to be cataloged in Drive 0 and press ENTER.

Now you can sit back and watch the computer do its work, or go do something else. The processing of each graphics image takes about one minute. If you have a disk full of single-screen images (22 is the maximum number you can have on one side of a standard disk), it will take about 22 minutes to create the Graphic Graphics Directory for that disk. When the last image on the picture disk is complete, the computer displays the complete directory on the screen and makes a pleasant beeping until you press any key.

Now comes the rest of your labor: swapping disks. You are prompted to put a directory disk in Drive 0. I have a lot of graphics on disk and I've found that I prefer to segregate these graphic directories onto disks by themselves. There would be no harm in saving the directory on the disk cataloged, pro-

---

Chris Brown lives in Siloam Springs, Ark., and has been a professional artist for 20 years. A CoCo enthusiast for five years, he has used his computer for everything from managing rental property to designing special logos and fonts. His computer art is distributed by Grafx.

vided enough free space is available. If there isn't, the program will warn you. In fact, it won't allow you to try to save the disk directory at all on a disk with less than three free grans, thanks to Line 700.

A note about the quality of the small images before we take a walk through the program's functions: It doesn't matter in which `PMODE` the image was created. *GRADIR* uses `PMODE 4` to allow the capture of the most detail. `PMODE 0` through `PMODE 3` screens require the same amount of time to process, but appear scrunched up (`PMODE 0 - PMODE2`) or not in color (`PMODE 3`). You won't, except in very rare instances, see the glorious colors of your original in the small directory version. Remember, the small directory version is a "proof copy" only.

Now to the workings of the program. A quick glance at the list of routines (Figure 2) and the program (Listing 1) shows a pretty straightforward approach, with the subroutines located at the beginning of the program for speed. The first subroutine (lines 30-100) draws the Hi-Res characters on the `PMODE4` Hi-Res screen. This subroutine requires five variables: color, `K2` (0-8); size, `S2` (1-63); X position, `PW` (0-255); Y position (`PQ` (0-192); and words, `N$`.

The Check File Length subroutine is a bit more esoteric. Grabbing one record at a time from the disk file, this routine calculates the start and end addresses from the MSB and LSB (most-significant and least-significant bytes) information contained in records 1 and 2, 3 and 4, 6, 8 and 9. The result, the length of the file in bytes, is stored in the variable `LONG`, which is used later in the program.

Line 180 contains the heading for the text screen. Revise this as you will. The pokes to the screen only put black spaces after my first and last names.

Line 200 sets up the array `GP` which positions each of the 22 possible small images in a discrete position on the screen. Reading the numbers in the `DATA` statement in pairs gives you X, Y coordinates. These coordinates, as determined by the processed picture number (`CN`), are used in Line 580.

Lines 210 to 300 set the array `L$(1)` to `L$(59)`. This array contains the `DRAW` instructions used by the Draw Letters subroutine. This, plus the drawing routine, I keep as an ASCII file on one of my many utility disks, merging it when I need alphanumerics on a graphics screen. This particular version is special for *GRADIR* because the letters had to be small. Different versions of this approach have been seen here in THE RAINBOW.

GRADIR Arrays and Variables

Arrays

`DF$(30)`	Disk filenames
`GP(22,2)`	Directory screen grid
`L$(59)`	Alphanumerics for titles
`M(98)`	Long File Image
`Q(100)`	Transfer of pic
`V(20)`	Processing of pic

String and real variables

`CN`	Pic Processing
`CT`	Directory count
`DE`	File divisions
`DN$`	Picture disk name
`DT$`	Date
`E`	X position for processing
`EXT$`	Disk file extension
`F`	Y position for processing
`F`	Free grans on pic disk
`F$`	Filename for file length check
`F1`	Free grans on directory disk
`I`	Loop counter
`K2`	Color of lettering
`L`	Letter loop counter
`L, C, S, X, P`	Used for computing disk file length
`LONG`	Length of disk file
`NA$`	Disk filename
`PQ`	Y position for lettering
`PW`	X position for lettering
`Q$`	Individual letter in letter routine
`S2`	Size of letters
`SE`	Disk sector
`X`	X position for processing
`Y`	Y position for processing
`Z$`	Keyboard input

GRADIR line breakdown

10	Set up arrays
30-100	Draw Letters routine
110-170	Check file length
180	Screen heading
200	Set up directory screen position grid
210-300	Define alphanumerics
310-330	Set up long file image
340-380	Input of pic disk name and date
390-460	Read disk directory
470-500	Check file lengths
510-600	Process image
610-670	Prepare for save
680-720	Save graphic directory screen
730-790	End of program menu

The heart of the program is in lines 390 to 460, the original of which is in the Disk BASIC Manual from Radio Shack. Of special note is Line 40, which rejects any file whose extension is not `PIC`. If your graphics are not filed as `PIC` but rather as `PIX`, the solution is simple. Make Line 410 read `PIX`. However, if you commonly use the extension `BIN` for your graphics screens, a real problem exists. If you substitute `BIN` for `PIC` in Line 410, the program will try to load any and all `BIN` extension files, which, if the file is not a graphic, could cause the computer to go nuts and lock up. My suggestion is to rename your graphics, using either PIC or PIX for the extension.

Lines 510 to 600 comprise the image processor. The routine loads each 6,143-byte-long image on the disk in turn, then processes it by taking every sixth byte on every sixth line and composing a picture in the upper left-hand corner of the screen. You may notice that the creation of the small image, because of the STEP 6, allows a dual use of the first screen. This small image is transferred with the GET and PUT in Line 580 from PMODE4 Screen One (pages 1-4) to Screen Two (PMODE4 pages 5-8) and labeled with the Draw Letters subroutine in the wink of an eye.

Lines 490 and 540 enable this program to avoid graphics files longer than the single PMODE 4 screen, such as the eight-page saves made with Derringer's *Master Design* or Colorware's *CoCo Max*. If the whole eight-page file were to be loaded, it would destroy the directory being created on PMODE 4 pages 5-8. To keep this from happening, the place marker created by Line 310 is used, with the proper filename, instead of a reduced image.

After the directory is completed, it is copied from pages 5-8 to pages 1-4 by Line 630. The disk filename you entered earlier, the date and the free grans on the picture disk are written to the directory screen and then the beeping begins in Line 680.

Pressing N when the program asks if you want to save the directory allows you the option of entering a new disk filename for the directory. If, at this point, you want to start over, simply press ENTER, which sends you to the end-of-program menu. Pressing Y at the SAVE prompt sends the program execution to Line 730.

Line 730 is a standard four-page graphics save. Line 740 starts the end-of-program menu. This menu gives you three choices: restart, end or menu. Restart runs the program from scratch. This is what you choose when you are ready to catalog your next graphics disk. End stops the program and returns you to BASIC. Menu is a convenience I added for myself. I have several graphics design program disks. All of them are menu driven, and the menu program on each disk is named MENU.BAS. A switch of the disks, two key presses and I'm three programs away. The lazy artist's graphic system.

Having cataloged all of your graphic disks, run each of the directories through a screen dump utility. Using the hard copy produced, you have a compact, concise and impressive catalog of all your graphics efforts, a computer artist's portfolio.

I will be glad to answer any questions about this program. My address is P.O. Box 648, Siloam Springs, AR 72761. ☐

The listing: GRADIR

180	222
230	140
290	4
380	192
550	224
670	128
END	136

```
10 CLEAR2000:DIML$(59),M(98),V(2
0),Q(100),DF$(30),GP(22,2)
20 GOTO190
30 '*******DRAW LETTERS******.
40 DRAW"BM"+STR$(INT(PW))+","+ST
R$(INT(PQ))+"C"+STR$(K2)+"S"+STR
$(S2)+";"
50 FOR L=1 TO LEN(N$)
60 Q$=MID$(N$,L,1):IF ASC(Q$)>97
THENQ$=CHR$(ASC(Q$)-32)
70 IF ASC(Q$)-31<1 THEN RETURN
80 IF Q$=CHR$(34) THEN DRAWL$(3)
:GOTO100
90 DRAWL$(ASC(Q$)-31)
100 NEXTL:RETURN
110 'check for file length
120 OPEN"D",1,F$,1:FIELD #1,1 AS
 A$:P=1:GOSUB150
130 GOSUB150:L=C*256:GOSUB 150:L
=L+C:GOSUB150:S=C*256:GOSUB 150:
S=S+C:Y=L+S-1:P=P+L:GOSUB150:GOS
UB150:Q=C:GOSUB150:GOSUB150:L=C*
256:GOSUB150:L=C+L
140 CLOSE#1:RETURN
150 IF P>LOF(1) THEN C=1:RETURN
160 GET #1,P:C=ASC(A$):P=P+1:RET
URN
170 RETURN
180 CLS:PRINTCHR$(128);"chris";C
HR$(128);"brown's    GRAPHICS DI
R  ";STRING$(32,128):POKE1036,39
:POKE1038,128:POKE1039,128:RETUR
N
190 GOSUB180:PRINT:PRINT"PLEASE
STAND BY WHILE          THE PRO
GRAM INITIATES.

                   THANKS."
200 FOR I=1TO22:READGP(I,1),GP(I
,2):NEXTI:DATA 0,0,51,0,103,0,15
5,0,207,0,0,38,51,38,103,38,155,
38,207,38,0,76,51,76,103,76,155,
76,207,76,0,114,51,114,103,114,1
55,114,207,114,0,152,51,152
210 L$(1)="BR7":L$(2)="BR1RULDBU
2U6RD6BD2BR4":L$(3)="BR3BU8D2BR2
U2BD8BR3":L$(4)="BR1BU5U3BR2D3U1
R1NL4BU1NL4BD7BR1":L$(5)="BU8NR4
D4R4D4L4R2D1U10D9BR5":L$(6)="BU8
R1D1L1U1R1BR3D2G4D2BR3R1U1L1D1R1
BR3":L$(7)="BR7H6U2R2D2G3D3R3E2B
D2BR3"
220 L$(8)="BR1BU6U2RD2BD6BR3":L$
(9)="BR1H1U7E1BD9BR1":L$(10)="BR
1E1U7H1BD9BR3":L$(11)="BR3BU3U3D
1NR2NL2NE2NG2NF2NH2BR4D5":L$(12)
="BR6U4D2L2R4BR4BD2":L$(13)="BR1
U1R1D3U2L1BR4"
230 L$(14)="BR1BU3R4BD3BR1":L$(1
5)="BR1U1R1D1L1BR4":L$(16)="BR1E
```

```
5BD5BR1":L$(17)="BR1BU1U3BU1BR1R
3BR1NG4BD1D3BD1BL1NL3BR3":L$(18)
="BR1BU4URD5BR2":L$(19)="BU5R4DG
3DR4BR1":L$(20)="BU5R4G2R2D3L4BR
7":L$(21)="BU5D3NR5R3U3D5BR4":L$
(22)="R4U3L4U2R3BD5BR3"
240 L$(23)="BR1NR3U3NU2R3D3BR3":
L$(24)="BR1BU5R4D2G3BR5":L$(25)=
"BR1U3NR3U2R3D5NL3BR1":L$(26)="B
R1BU2NR4U3R4D5BR1":L$(27)="BR1BU
4BR4URDLBD3RDLUBD1BR1":L$(28)="B
R1BU4RBD3D2ULBR3"
250 L$(29)="BR1BU5BR4G2F2BR1":L$
(30)="BR1BU5NR4BD2R4BD3BR1":L$(3
1)="BR4BU4F2G2BR3":L$(32)="BR1BU
2U3R4D1G2D3BR1":
260 L$(34)="BR1U5R3D2NL3D3BR1":L
$(35)="BR1U5R3D2RNL4D3NL3BR1":L$
(36)="BR1U5NR3D5R3BR1":L$(37)="B
R1U5R3BR1BD1D3BD1BL1L3BR5":L$(38
)="BR1U5NR3D2NR3D3R3BR1":L$(39)=
"BR1U5NR3D2R3BD3BR1":
270 L$(40)="BR1BU1U3BU1BR1R3BD2N
L1D3BL1L2BR3BR1":L$(41)="BR1U5D2
R3U2D5BR1":L$(42)="BR3NU5BR3":L$
(43)="BR1BU3D2BD1BR1R2BR1BU1U4BD
5BR1":L$(44)="BR1U5D2R2NE2F3BR1"
280 L$(45)="BR1NU5R3BR1":L$(46)=
"BR1U5F2E2D5BR1":L$(47)="BR1U5F4
U4D5BR1":L$(48)="BR1BU1U3BU1BR1N
R2BD5R2BR1BU1U3BD4BR1":L$(49)="B
R1U5R2BR1BD1D1BD1NL2BD2BR1"
290 L$(50)="BR1BU1U3BU1BR1R3BR1B
D1D3BD1BL1L3BR2NF2BR5":L$(51)="B
R1U5R3BR1BD1L1BD1BL1NL1F3BR1":L$
(52)="BR1BU5BR3L3DF3DL3BR5":L$(5
3)="BR4BU5NR3NL3D5BR5":L$(54)="B
R1BU5D4BD1BR1R2BR2BU1U4BD5BR1"
300 L$(55)="BR1BU5D2F3E3U2BD5BR1
":L$(56)="BR1BU5D4FRENU4FREU4BD5
BR1":L$(57)="BR1E5BL5F5BR1":L$(5
8)="BR1BU5F2ND3E2BD5BR1":L$(59)=
"BR1BU5R5G5R5BR1"
310 PMODE4,1:PCLS5:LINE(1,1)-(44
,32),PRESET,BF:N$="LONG":K2=5:S2
=4:PW=10:PQ=13:GOSUB40:N$="FILE"
:PQ=23:GOSUB40:LINE(6,4)-(38,28)
,PSET,B
320 GET(1,1)-(44,32),M,G:PCLS5
330 PMODE4,5:PCLS5:PMODE4,1:PCLS
340 'start up routine
350 PRINT:INPUT"ENTER DISK NAME
(8 CHAR. MAX)    -->";DN$:IF LEN(
DN$)>8 THEN350
```

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```
360 LINEINPUT"DATE (ANY FORMAT)"
;DT$
370 PRINT:PRINT"PUT DISK IN DRIV
E 0 AND PRESS   ENTER":INPUTQ$:G
OSUB180
380 K2=4:S2=4:CT=0:CN=0:PRINT@64
,"READING DIRECTORY"
390 '**READ DIRECTORY TRACK
      main loop
400 FOR SE= 3 TO 11:DSKI$0,17,SE
,A$,B$:A$=A$+LEFT$(B$,114):FOR D
E= O TO 7:PT=DE*32:NA$=MID$(A$,P
T+1,8):EXT$=MID$(A$,PT+9,3)
410 IF EXT$<>"PIC" THEN 450
420 IF LEFT$(NA$,1)=CHR$(255) TH
EN 450
430 IF LEFT$(NA$,1)=CHR$(0) THEN
GOTO450
440 CT=CT+1:DF$(CT)=NA$+"/"+EXT$
450 NEXTDE,SE:FR=FREE(0)
460 IF CT=0 THENPRINT"SORRY, NO
PICS ON THIS DISK.": GOTO750
470 PRINT"CHECKING FILE LENGTHS"
:FOR TT=1 TO CT:F$=DF$(TT):GOSUB
120:LONG=Y-S
480 PRINTUSING"## %            % #
####";TT,DF$(TT),LONG
490 IF LONG>6143 THEN DF$(TT)=DF
$(TT)+"MAX"
500 NEXTTT
510 'process graphic screens
520 PMODE4,1:SCREEN1,0:FOR I = 1
 TO CT
530 IFDF$(I)=""THEN560
540 IFRIGHT$(DF$(I),3)="MAX"THEN
N$="MAX":DF$(I)=LEFT$(DF$(I),8):
PMODE4,1:PUT(1,1)-(44,32),M,PSET
:CN=CN+1:GOSUB580:GOTO560
550 PMODE4,1:SCREEN1,0:PCLS5:LOA
DM DF$(I):GOSUB 570
560 NEXTI:GOTO630
570 F=-1:E=0:CN=CN+1:FOR Y=0 TO
192 STEP 6:F=F+1:E=0:FOR X=0 TO
255 STEP 6:E=E+1:PMODE4,1:GET(X,
Y)-(X+1,Y),V,G:PUT(E,F)-(E+1,F),
V,PSET:PUT(E,F)-(E+1,F),V,PSET:N
EXTX,Y
580 GET(2,2)-(43,30),Q,G:PMODE4,
5:SCREEN1,0:PUT(GP(CN,1),GP(CN,2
))-(GP(CN,1)+41,GP(CN,2)+28),Q,P
SET
590 K2=4:S2=4:PW=GP(CN,1):PQ=GP(
CN,2)+35:N$=LEFT$(DF$(I),8):GOSU
B40
600 IF CN=CT THEN 630
610 RETURN
620 'prepare for save
630 FORI=8TO5STEP-1:PCOPY I TO I
-4:NEXT
640 N$=DN$
650 PMODE4,1:SCREEN1,0:LINE(103,
158)-(255,192),PRESET,B:S2=4:PW=
105:PQ=168:GOSUB40
660 PW=105:PQ=178:N$=DT$:GOSUB40
670 PW=105:PQ=188:N$="FREE GRANS
 = "+STR$(FR):GOSUB40
680 Z$=INKEY$:SOUND10,2:SOUND100
,2:IFZ$="" THEN680
690 GOSUB180:PRINT"REMOVE PICTUR
E DISK AND PUT      GRAPHICS DIRE
CTORY DISK IN       DRIVE ZERO FO
R save":INPUT"PRESS ENTER TO CON
TINUE";Z$
700 GOSUB180:F1=FREE(0):PRINT:PR
INT"FREE GRANS ON THIS DIRECTORY
    DISK:"F1
710 IF F1<3 THENPRINT"- -  not e
nough room! - -        START NEW
 DIRECTORY DISK":INPUT"PRESS ENT
ER WHEN READY";Z$:GOTO700
720 PRINT"SAVE THIS DIRECTORY AS
          "DN$" ";:INPUT"(Y/N)";
Z$:IF Z$="Y" THEN 730 ELSE INPUT
"NEW FILENAME OR <ENTER>";DN$:IF
 DN$=""THEN740
730 DN$=DN$+"/PIC":SAVEM DN$,358
4,9727,40999
740 GOSUB180:IF Z$="Y"THENPRINT"
GRAPHIC DIRECTORY
"DN$" SAVED!"
750 PRINT:PRINT"r > RESTART PROG
RAM":PRINT"e > END PROGRAM":PRIN
T"m > GRAPHIC SYSTEN MENU":PRINT
:PRINT"PRESS KEY OF CHOICE."
760 Z$=INKEY$:IF Z$=""THEN760
770 IF Z$="R" THEN RUN
780 IF Z$="E" THENEND
790 IF Z$="M" THEN 800 ELSE760
800 GOSUB180:PRINT"PLACE SYSTEM
DESIGN DISK IN      DRIVE ZERO";:
LINEINPUT" AND PRESS ENTER";Z$:R
UN"MENU/BAS:0"
```

Hint . . .

Customizing Color

While disassembling Extended BASIC on the CoCo 3, I found that the PALETTE CMP default values occupy memory locations from $E654 to $E663. Default values for PALETTE RGB are in locations $E664 to $E673 and the present PALETTE values are in locations $E678 to $E687. You can customize two color sets by poking respective values in the PALETTE CMP and PALETTE RGB ranges and then switching between them with one command. You can then peek the present PALETTE values to find out what color is in what slot.

Jason Forbes
Mexico, NY

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See reviews in: July '84 Rainbow, Oct. '84 Hot CoCo

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A handy disk utility for the CoCo 3

Take Command of CoCo 3 Drives

By Michael N. Jorgenson

I have a vast assortment of utilities for the older CoCos, but only a few of them will run on the new CoCo 3. So, I have written my own utility.

DU-3 is a disk utility written in BASIC, and it contains many interesting features. The operating commands are Copy, Drive, Kill, Load, Name, Scan, Quit and Verify. An `INKEY$` control letter is given for each command.

Upon start-up, the directory of a disk in Drive 0 is read and displayed in split format on the 40-column text screen in numerical order with extensions and granule allocations. The free granule space of the disk, if any, will also be shown.

The BREAK key can be used to escape any function, or to read in another disk on the same working drive. Pressing C copies any or all files from one disk to another. The program prompts for the destination drive number (the default is Drive 0). A single-drive copy can be made on any working drive. Use the D key to change your working drive. Press D and the number of the drive you want to use (0 to 3); the default is 0. Pressing K kills any or all files on the working drive disk.

To load any file on the working drive disk, press L. Use N to rename any file on the working disk drive, including the extension. S scans the working drive disk; the program prompts for a starting track and sector. Use Q to exit, and use V to toggle Verify on and off.

DU-3 only works on the Color Computer 3. It does not use a speed-up poke, but it will execute a `PCLEAR1`. This is to minimize disk-swapping on single-drive systems. The "Insert Destination Disk" prompt that appears on single-drive copies is in Disk BASIC, which looks a bit crummy on the 40-column screen. I could not find a way to work around it.

DU-3 reads and displays up to 68 files. If there are more than 36 files, the display scrolls upward off the screen, but does not affect program operation.

(Questions about this program may be directed to the author at 749 Tower Blvd., Lorain, OH 44052, 216-282-9355. Please enclose an SASE for a reply when writing.)

Michael Jorgenson is an electronics technician and a novice programmer. He lives in Lorain, Ohio, and enjoys working with Disk BASIC, games, utilities and telecommunications. He is also a published author of several short Fantasy/Adventure articles and games.

120 219
205 78
300 30
380 17
500 38
END 65

The listing: `DU-3`

```
10 '****************
15 ' A DISK UTILITY
20 ' FOR THE COCO-3
25 ' MIKE JORGENSON
30 '****************
35 '
40 PCLEAR1:CLEAR3500
45 DIM FL$(68),XF(68),V(68)
```

```
50 CLS:ON BRK GOTO75
55 PALETTE 9,0:PALETTE 10,2
60 WIDTH 40:VERIFY ON
65 V$="ON":A$="0":GOTO75
70 FORX=1TO DF:FL$(X)="":NEXT
75 GOSUB325:ATTR 2,0
80 PRINT"C= COPY  D= DRIV  K= KI
LL  L= LOAD":PRINT"   N= NAME  S
= SCAN  Q= QUIT  V= "V$
85 Q$=INKEY$:IFQ$=""THEN85
90 Q=INSTR("CDKLNSQV",Q$)+1:ON Q
 GOTO85,105,210,240,565,290,480,
610,95
95 IFV$="ON"THENV$="OFF":VERIFYO
FF:GOTO100 ELSEV$="ON":VERIFYON
100 LOCATE 3,Y:GOTO80
105 IF DF<1THEN100 ELSEGOSUB440
110 GOSUB370:ATTR 2,0:PRINT"COPY
 ALL OR SINGLE FILE:  <A/S> ?"
115 Q$=INKEY$:IFQ$="A"THEN165 EL
SEIFQ$="S"THEN120 ELSE115
120 LOCATE 3,Y:LINEINPUT"ENTER T
HE FILE NUMBER TO COPY ?  ";C$:C
=VAL(C$):IF C>DF OR C<1THEN100
125 ATTR 3,0:IF A=B THEN140
130 PRINT:PRINT"  COPYING:  "FL
$(C)" TO "B$:COPY""+FL$(C)+":"+A
$TO""+FL$(C)+":"+B$
135 SOUND100,6:GOTO160
140 CLS:PRINT:PRINT"   COPYING:
 "FL$(C):PRINT:PRINT"    ";
145 COPY""+FL$(C)+":"+A$
150 PRINT:PRINT:SOUND100,6
155 LINEINPUT"  INSERT SOURCE D
ISK, THEN <ENTER> ";Q$
160 GOSUB370:ATTR 2,0:GOTO80
165 LOCATE 3,Y:PRINT"COPY ALL, A
RE YOU SURE:  <Y/N> ? "
170 Q$=INKEY$:IFQ$=""THEN170
175 IF Q$<>"Y"THEN100
180 ATTR 3,0:IF A=B THEN190
185 Y=Y+2:FORX=1TO DF:LOCATE 3,Y
:PRINT"COPYING:  "FL$(X)" TO "B$
:COPY""+FL$(X)+":"+A$TO""+FL$(X)
+":"+B$:NEXT:SOUND100,6:GOTO160
190 CLS:FORX=1TO DF
195 PRINT:PRINT:SOUND100,6:LINEI
NPUT"  INSERT SOURCE DISK, THEN
 <ENTER> ";Q$:PRINT:PRINT"   ";
200 COPY""+FL$(X)+":"+A$
205 NEXT:GOTO150
210 GOSUB470:LOCATE 3,6
215 PRINT"CHANGE WORKING DRIVE T
O:  ";:ATTR 2,0:PRINT"<0-3> ?"
220 A$=INKEY$:IFA$=""THEN220
225 A=VAL(A$):IF A>3THEN220
230 IF A<1THENA$="0"
```

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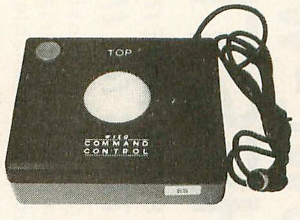

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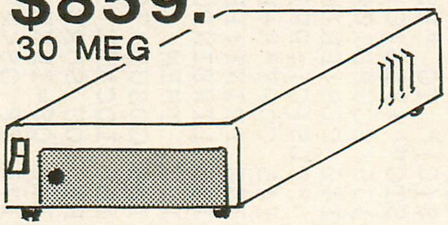

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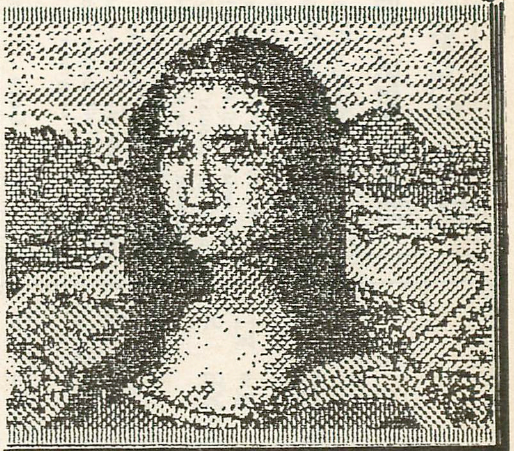

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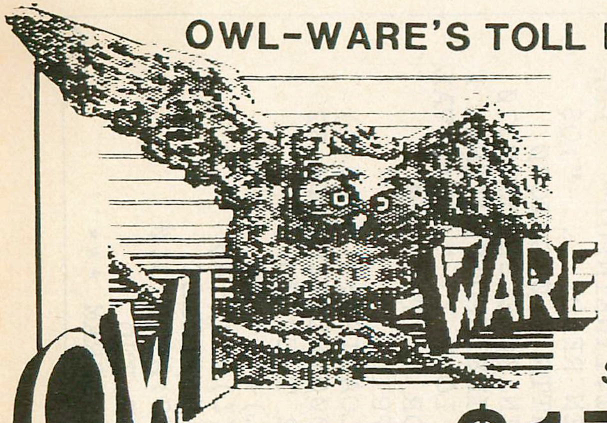

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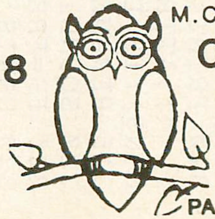

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```
235 DRIVE A:GOTO70
240 IF DF<1THEN100 ELSEGOSUB370
245 ATTR 2,0:PRINT"KILL ALL OR S
INGLE FILE:  <A/S> ?"
250 Q$=INKEY$:IFQ$="A"THEN270 EL
SEIFQ$="S"THEN255 ELSE250
255 LOCATE 3,Y:LINEINPUT"ENTER T
HE FILE NUMBER TO KILL ?  ";K$:K
=VAL(K$):IF K>DF OR K<1THEN100
260 PRINT:ATTR 3,0
265 PRINT"   KILLING:  "FL$(K):K
ILL""+FL$(K):IF DF>1THEN SOUND10
0,6:GOTO70 ELSE70
270 LOCATE 3,Y:PRINT"KILL ALL, A
RE YOU SURE:  <Y/N> ? "
275 Q$=INKEY$:IFQ$=""THEN275
280 IF Q$<>"Y"THEN100
285 ATTR 3,0:Y=Y+2:FORK=1TO DF:L
OCATE 3,Y:PRINT"KILLING:  "FL$(K
):KILL""+FL$(K):NEXT:GOTO70
290 IF DF<1THEN100 ELSEGOSUB370
295 ATTR 2,0:LINEINPUT"ENTER A F
ILE NUMBER TO RENAME ?  ";N$:N=V
AL(N$):IF N>DF OR N<1THEN100
300 GOSUB470:LOCATE 3,6
305 PRINT"RENAME:  "FL$(N)" - TO
 WHAT ?":ATTR 2,0
310 PRINT:PRINT"    <INCLUDE EXT>
:  ";:ATTR 3,0:LINEINPUT N$:L=LE
N(N$):IF L>12 OR L<1THEN160
315 RENAME""+FL$(N)TO""+N$
320 SOUND100,6:GOTO70
325 FR=FREE(A):DF=0
330 DSKI$ A,17,2,X$,Y$
335 FORX=3TO9:DSKI$ A,17,X,Y$,Z$
:FORK=1TO128 STEP32:GOSUB340:NEX
TK:Y$=Z$:FORK=1TO128 STEP32:GOSU
B340:NEXTK,X:GOTO370
340 SB$=MID$(Y$,K,14):L$=LEFT$(S
B$,1):IFL$=CHR$(0)THENRETURN ELS
EIFL$=CHR$(255)THENY=128:RETURN
345 IF ASC(SB$)>127THENRETURN
350 DF=DF+1:XF(DF)=0:V(DF)=0:Y=A
SC(RIGHT$(SB$,1))+1:FL$(DF)=LEFT
$(SB$,8)+"/"+MID$(SB$,9,3)
355 XF(DF)=ASC(MID$(SB$,12,1))
360 V(DF)=V(DF)+1:Z=ASC(MID$(X$,
Y,1)):IF Z<78THENY=Z+1:GOTO360
365 RETURN
370 GOSUB470:IF DF>0THEN380
375 LOCATE 3,6:PRINT"NO FILES PR
ESENT IN DISK DIRECTORY!":SOUND1
00,6:Y=11:LOCATE 3,Y:RETURN
380 T=0:IF DF<22THENY=4 ELSEY=3
385 FORX=1TO DF:IF T=0 AND Y=17T
HENY=Y-1:FORK=1TO6:PRINT:NEXT
390 IF T=0THENT=1:Y=Y+1:Z=1 ELSE
T=0:Z=20
395 ATTR 2,0:LOCATE Z,Y
400 IF X<10THENPRINTX;" ";:ATTR
3,0:PRINTFL$(X);V(X):GOTO415
405 PRINTX;:ATTR 3,0
410 PRINTFL$(X);V(X)
415 NEXT:ATTR 2,0:IF T=0THENY=Y+
1:Z=5 ELSEZ=24
420 LOCATE Z,Y:PRINT"Free =";
425 ATTR 2,0,B:PRINT FR
430 IF DF<22THENY=Y+3 ELSEY=Y+2
435 LOCATE 3,Y:RETURN
440 GOSUB470:LOCATE 3,6:PRINT"TH
E SOURCE DRIVE IS: ";A:PRINT
445 PRINT"   DESTINATION DRIVE:
 ";:ATTR 2,0:PRINT"<ENTER=0> ?"
450 B$=INKEY$:IFB$=""THEN450
455 B=VAL(B$):IF B>3THEN450
460 IF B<1THENB$="0"
465 RETURN
470 CLS:LOCATE 7,1:ATTR 1,0,B
475 PRINT"<<<  COCO-3 DISK UTIL
 >>>":ATTR 3,0:RETURN
480 CLS:LOCATE 7,1:ATTR 1,0,B
485 PRINT"<<<  COCO-3 DISK SCAN
 >>>":LOCATE 3,6:ATTR 3,0:PRINT"
SCANNING DISK ON DRIVE: ";A
490 ATTR 2,0:LOCATE 3,9:INPUT"ST
ART AT WHICH TRACK:  <0-34> ";SX
495 IF SX>34THEN490
500 LOCATE 3,11:INPUT"START AT W
HICH SECTOR:  <1-18> ";SK
505 IF SK<1 OR SK>18THEN500
510 FOR X=SX TO 34
515 FOR K=SK TO 18
520 DSKI$ A,X,K,Y$,Z$
525 ATTR 3,0:PRINT:PRINT
530 PRINT"  "Y$;Z$
535 ATTR 2,0:PRINT:PRINT
540 PRINT"  ";X,K
545 NEXT K:SK=1:NEXT X
550 ATTR 3,0,B:SOUND100,6
555 PRINT:PRINT:LINEINPUT"   PRE
SS <ENTER> WHEN READY ... ";Q$
560 GOSUB370:ATTR 2,0:GOTO80
565 IF DF<1THEN100 ELSEGOSUB370
570 ATTR 2,0:LINEINPUT"ENTER A F
ILE NUMBER TO LOAD ?  ";L$:L=VAL
(L$):IF L>DF OR L<1THEN100
575 ATTR 3,0:PRINT
580 PRINT"   LOADING:  "FL$(L)
585 FORX=1TO1000:NEXT:WIDTH 32
590 IF XF(L)=2 THEN600
595 LOAD FL$(L)+":"+A$
600 LOADM FL$(L)+":"+A$
605 POKE &HFF40,0:EXEC
610 PCLEAR4:CLS:ATTR 3,0
615 PALETTE CMP:END
620 '*** END PROGRAM ***
```

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16K
ECB

Creating a Review Program

By Joseph Kolar
Rainbow Contributing Editor

The beginner who has stayed the course and faithfully struggled through these "Basic Training" tutorials, has reached the point where, after a review, he can consider himself a veteran.

Today, the project is to create a review program. A sentence in one language is displayed on the screen. A second, translating-language sentence with a randomly selected, blanked-out word/phrase is displayed below. Without any hints (except comparison with the first language) he is required to take a guess as to the missing word/phrase that would make the sentence whole. When he presses any key, the answer will be filled in. At this point, you may want to set aside this issue of THE RAINBOW, take up the challenge and see what you can come up with. If you have been studying these inspiring, fun-filled tutorials for the past year, you have the background to make a creditable program.

Key in lines 0 to 6, 20, 21, 23, 24 and 995 from Listing 1. We will use Line 20 for the first language and Line 21 for the translating language. Line 1 gives the starting locations on the text screen. It also chooses a random color, other than black or cyan, and having chosen a color, proceeds to Line 10. Line 10 clears the screen and is directed to a selected line number of a portion of the program that is currently being developed. CoCo stores (memorizes) the two strings, `X$` and `Y$` in lines 20 and 21, respectively, and awaits our pleasure.

Temporarily, insert `P=31:Q=P:GOSUB3:EXEC44539` as Line 22. `P` and `Q` are the variables that give the approximate number of characters/spaces in strings `X$` and `Y$`, respectively. CoCo is told to go to Line 3, follow the instructions and return.

Line 3 tells CoCo to print, beginning at `X`, `P` number of character/spaces, starting from the left side of string `X$`, and to abort any trailing blank spaces at the end of the last row. Ditto for the second string. CoCo returns to Line 22 and waits for any key to be pressed. Run your work.

This is a good time to check spelling, punctuation and formatting. In fact, you will want to create Line 2000: `P=181:Q=P:GOSUB3:EXEC44539:RETURN` and change Line 22 to `GOSUB2000`. Now run.

In the second translating language we want to blank out `THE CITY`. List Line 21. Directly from the screen, we count to the numerical value that starts the blank-out area and assigns it the variable `A`. (Remember, `0` is the upper left-hand location.)

Count the number of spaces to be blanked out. The first space after the starting quote is number `1`. Count up to and include the space after the last letter to be blanked out. Assign the total a variable, `N=11`. This system gives you a little leeway. For instance, in Line 23, your calculations can be pretty casual and imprecise. If `A=0` then `N=10` or `N=11`; if `A=1` then `N=9` or `N=10`; if `A=2` then `N=8` or `N=9`. All these pairs will work equally well.

Delete Line 22. Line 23 provides both the `A` and `N` information that CoCo demands before it can zoom over to Line 5 and work its tail off.

List lines 3 through 5. Allowing for extra-long, multiple-row sentences, CoCo trots up to Line 3 and prints both strings, `X$` and `Y$`, in their entirety. Then it jumps back to Line 5. Beginning at `Y`, plus any offset (`A`), it will print a row of `CHR$(143)` (the same color as the screen background), for a total of `N` spaces. At this point, it returns to Line 24 and waits for you-know-what!

CoCo shoots over to Line 4, where the translation line is reprinted in place and restored to a complete sentence. CoCo waits for a key to be pressed, whereupon it clears the screen, chooses a random color, and returns to be directed to the next pair of sentences. Run this.

For the heck of it, edit Line 5 so `143` becomes `128`, and run. That doesn't look too bad. If you prefer a black blank-out, your `A` value should begin at the location of the first letter to be hidden, and `N` should include from the first letter through the last letter of the blanked-out word/phrase. In this case, `A=2:N=8`.

For the nonce, edit Line 5 so `128` is `143` and make sure `A=0:N=11` in Line 21. Run to make sure.

List lines 20 to 21. It doesn't take long

Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of the Color Computer.

to note that we could blank out other areas.

Insert `GOTO 25` as Line 22. Key in lines 25 and 26. Insert Line 40 as a remark statement, to hold the spot open for the next pair of sentences and to avoid the UL Error we were getting. Now run.

In Line 25, all we needed to do was select new `A` and `N` values. Line 26 is identical to Line 24. This time `BIG` was washed out. Change `25` to `27` in Line 22. Key in lines 27 and 28. Run and see `OLD` vanish. Again, the lines were similar, except for new `A` and `N` values.

Change `27` to `29` in Line 22. Key in lines 29 and 30. You can see, `AND` got the treatment this time. Run. Sure 'nuff! Notice that since the next line will be Line 40, I did not put `:GOTO40` at the end of Line 30. But, as a beginner, you should use it and CoCo won't holler. `CSAVE "PART1"`.

Best laid plans often go awry. While I was mulling over what we had wrought, it struck me that we were asking CoCo to do something in an oblique way, for which CoCo has a perfectly good function, `MID$`. Do you recall, veterans of past bouts with `MID$`, that it was pointed out that there were both a `MID$` statement, which we used to good advantage, and a `MID$` function, which I glossed over ever so quickly?

Without being aware of it, I proved the old adage, "There is always more than one way to do anything." If you crack open your ECB manual, you will note that `MID$(X$,A,N)` equals replacement, where `X$` is the string, `A` the position of first character to be blanked out and `N` is equal to the number of characters to be wiped out. Doesn't that sound familiar?

Consider: `X$`, `A` and `N` prepare to do exactly what we want to occur and yes, we have a replacement, `STRING$(N,143)`. Look Ma, no `MID$` function!

You are invited to try your hand at working out a small program to duplicate what our tutorial does, up to this point. Hint: Use lines 1, 10, 20, 21, 40 and 995. Use `PART1` advisedly. In the next tutorial, you will be given one answer plus some insights on how it was constructed. In the meantime, let us continue. We have four different areas blanked out. Rather than get bored stiff displaying all four variants, wouldn't it be better if we picked one at random, displayed it and moved on to the next pair?

Key in Line 22 and run it a few times. We shall begin the next set of sentences starting at the reserved Line 40. Key in Lines 40, 41 and 43. Change Line 10 from `20` to `40`, type `42 GOSUB2000` and reserve Line 60 (`60'`). Run this and check it out.

This time we are consolidating the two-line format (as in lines 23 and 24) and turning it into a one-liner. Insert Line 42: `GOTO45`. Key in Line 45 and run.

> *"Without being aware of it, I proved the old adage, 'There is always more than one way to do anything.'"*

Change Line 42 to read `GOTO 47` and key in Line 47. Now run. You can drop the `:GOTO60` from Line 47, if you like.

We are only making three variants. Key in Line 42 from the listing and run a few times. In Line 10, change `40` back to `20` and run.

Notice that we work methodically, checking each line as we add them. It is no sweat to isolate and correct a newly created mistake. Hasty, unverified work only guarantees a difficult debugging session later.

In Line 10, change `20` to `60`. Key in Lines 60 and 61. Reserve Line 80 (`80'`). Insert Line 62: `GOSUB2000`. Now run. Check the format, spelling and punctuation.

Key in lines 63 and 65 and run. Re-key Line 62, `GOTO65` and run. At this stage, we note that an integral part of our program is the sequence `GOSUB5:EXEC44539:GOSUB4`. This is a pain to key in frequently. How can we shorten this repetitious task? Key in Line 6. Sure! Create a `GOSUB` out of the sequence! Key in Line 67. Change Line 62 to `GOTO67` and run. This is good!

We could go back and change lines 23 through 30, 43 through 47 and 63 through 65 to reflect this modification. It doesn't really matter. Long form or short form, both accomplish the mission equally well. From now on, we shall use the condensed form.

Re-key Line 62 from the listing and run. In the next pair of sentences, we shall reverse the languages to get another perspective. Here, again, are the steps in creating this routine. Change `60` to `80` in Line 10. Key in lines 80, 81 and 83. Reserve Line 100 (`100'`). Key in `82 GOSUB2000` and run.

Re-key `82 GOTO85`. Key in Line 85 and run.

Re-key `82GOTO87`. Key in Line 87. Run until all the variations check out.

We switched languages to see if this pairing was better than the original presentation. Why do we do the obvious and check what we know will work? We try every variation we can think of. This repeated toying with the program may turn up a dormant bug. It may also give us other ideas to pursue. You never know what you will think up while doing monotonous tasks. Using the previous procedure, work out the next pair of sentences from lines 100 through 107.

You have become aware of how untaxing it is to create this program. A pair of sentences is chosen, portrayed and checked out on the screen; various blank-outs are decided upon; `A` and `N` values are determined; and so forth.

The line-numbering is consistent throughout. In the random-selection lines, the `ON` line is easy to construct. Looking at it another way, using `L=20` to indicate the program line number we have:

`L`	`X$`
`L+1`	`Y$`
`L+2`	(temporary line pointers)
`L+2`	`M=RND(x):ON M GOTO L+3, L+5, L+7`, etc.
`L+3`	variant 1
`L+5`	variant 2
`L+7`	variant 3
`L+20`	next `X$`

We increment each `L` by `+20` to allow for many variants in long sentences. The case is made to show that a simple, consistent procedure is lots of fun to use and results in rapid progress.

Thus far, we have been fooling around with the second language. Who knows when we will have an occasion to blank out a portion of the first language? Let us prepare a routine to add to the armaments in our arsenal of `GOSUB` routines.

To consult our program, list the first 10 lines and note that Line 5 did the blank-outs on `Y$`. A similar line with one judicious change should do the trick. Key in lines 7 and 123 from the listing. Change `8` to `7` in Line 123 and run. No Good! We get a flickering `X$`. That means it is probably OK, but CoCo, not given a warning to wait for a key press, flickers through it and goes on to repeat.

List lines 5 through 7. We see in Line 6 that after `GOSUB5`, which did the blanking, we had the pause that refreshes (`EXEC44539`). Although an easy alternate way may come to mind, we shall be true to our system and key in Line 8. Change `7` to `8` in Line 123. Can you think of the other way that seems obvious? Run this.

CoCo displayed both sentences, blanked out and then restored the word in `Y$`, and then blanked out and restored the definition in `X$`.

Remember, we are experimenting! Re-key 122 `GOTO125`. Key in Line 125 and run.

This time, we add `A` and `N` values to display blank-outs and restorations in both `Y$` and `X$`. In Line 125, delete the second `A=6:` and run. CoCo picked up the last `A` value and ran with it.

List lines 120 through 123. You can see why no new `A` and `N` values were given for `GOSUB8` to work with. In lines 120 and 121, `FIRST` and `ERSTE` both begin at `A=6` and are `N=6` spaces long.

Change `125` to `127` in Line 122. Key in Line 127. Note the abbreviated Line 127. Again, we do not require a second set of `A` and `N` values, and the `GOTO140` was not used because it's redundant.

Still experimenting, we try out a pair of sentences that require more than one row to display. You know the plan of attack. Check out this last routine on your own.

After you finish this task, we meditate a while and think: We have chosen one variant at random from each pair of sentences and displayed it. Then we chose and displayed a random variant from the next pair, going through all the sentences. Line 995 returns to recycle.

Instead of always beginning at the first pair at Line 20, why couldn't we drop down at random and begin at any selected pair? Re-key `10 CLSZ`. Key in Line 11 and run.

It works, but we never change background colors. Change `10` to `1` in Line 995 to go to the line that chooses a new color. We get a hint every time a new color is portrayed that we ran through a complete set and a new one is being announced.

To make `X$` in the last two pairs end up restored, change `8` to `9` in lines 143 through 149. Key in Line 9 and run.

If we don't want the last pair of sentences in our program, we can alter Line 11 to omit them. Change `7` to `6` and, if you are a perfectionist, delete `,140`. Now run.

You could end by keying in lines 990 and 999, both unmasked, and masking Line 995. Run and `CSAVE"PROGRAM"`. But, that is not truly random.

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Unless the last pair at lines 140 and 141 *are chosen*, CoCo proceeds sequentially, from its beginning, `ON M`, chosen in Line 11. To avoid the predictability of repeating a sequence of sentences, try this:

Make sure Line 10 reads `CLSZ`. Change all the various `GOTO`s to `GOTO 1` in the following lines: 24, 26, 28; 43 through 47; 63 through 67; 83 through 87; 103 through 107; 123 and 125. Add `:GOTO1` at the end of lines 30 and 127 and run.

That is the end of the review session. I hope you enjoyed plodding through the listing, and used some of the tricks you studied in the past. This program demonstrates how we make CoCo bend to our will — willingly! ☐

The listing: `LANGTRAN`

```
0 '<LISTING1>
1 X=97:Y=225:Z=RND(7)+1:IF Z=6 G
OTO1 ELSE GOTO 10
3 PRINT@X,LEFT$(X$,P);:PRINT@Y,L
EFT$(Y$,Q);:RETURN
4 Q=181:PRINT@Y,LEFT$(Y$,Q);:EXE
C44539:CLSZ:RETURN
5 P=181:Q=P:GOSUB3:PRINT@Y+A,STR
ING$(N,143);:RETURN
6 GOSUB5:EXEC44539:GOSUB4:RETURN
7 P=181:Q=P:GOSUB3:PRINT@X+A,STR
ING$(N,143);:RETURN
8 GOSUB7:EXEC44539:RETURN
9 GOSUB8:GOSUB3:EXEC44539:RETURN
10 CLSZ:GOTO20
11 M=RND(7): ON M GOTO 20,40,60,
80,100,120,140
20 X$="  DIE STADT IST GROSS UND
 ALT. "
21 Y$="  THE CITY IS BIG AND OLD
. "
22 M=RND(4): ON M GOTO 23,25,27,
29
23 A=0:N=11:GOSUB5
24 EXEC44539:GOSUB4:GOTO40
25 A=13:N=4:GOSUB5
26 EXEC44539:GOSUB4:GOTO40
27 A=22:N=5:GOSUB5
28 EXEC44539:GOSUB4:GOTO40
29 A=18:N=4:GOSUB5
30 EXEC44539:GOSUB4
40 X$="  DIESER BERG IST HOCH. "
41 Y$="  THIS MOUNTAIN IS HIGH.
"
42 M=RND(3): ON M GOTO 43,45,47
43 A=0:N=16:GOSUB5:EXEC44539:GOS
UB4:GOTO60
45 A=18:N=6:GOSUB5:EXEC44539:GOS
UB4:GOTO60
47 A=7:N=9:GOSUB5:EXEC44539:GOSU
B4:GOTO60
60 X$="  DER ANDERE BERG IST NIE
DRIG. "
61 Y$="  THE OTHER MOUNTAIN IS L
OW. "
62 M=RND(3): ON M GOTO 63,65,67
63 A=6:N=15:GOSUB5:EXEC44539:GOS
UB4:GOTO80
65 A=24:N=5:GOSUB5:EXEC44539:GOS
UB4:GOTO80
67 A=6:N=A:GOSUB6:GOTO80
80 X$="  HERE IS A BRIDGE. "
81 Y$="  HIER IST EINE BRUECKE.
"
82 M=RND(3): ON M GOTO 83,85,87
83 A=0:N=7:GOSUB6:GOTO100
85 A=11:N=14:GOSUB6:GOTO100
87 A=16:N=9:GOSUB6:GOTO100
100 X$="  THERE IS ALSO A BRIDGE
. "
101 Y$="  DORT IST AUCH EINE BRU
ECKE. "
102 M=RND(3):ON M GOTO103,105,10
7
103 A=0:N=7:GOSUB6:GOTO120
105 A=11:N=5:GOSUB6:GOTO120
107 A=21:N= 9:GOSUB6:GOTO120
120 X$="  THE FIRST HOUSE IS SMA
LL. "
121 Y$="  DAS ERSTE HAUS IST KLE
IN. "
122 M=RND(3): ON M GOTO 123,125,
127
123 A=6:N=6:GOSUB6:GOSUB8:GOTO14
0
125 A=6:N=11:GOSUB6:A=6:N=12:GOS
UB8:GOTO140
127 A=21:N=7:GOSUB6:GOSUB8
140 X$="  I SHAVE MYSELF IN FRON
T OF  THE MIRROR. "
141 Y$="  ICH RASIERE MICH VOR D
EM   SPIEGEL. "
142 M=RND(4): ON M GOTO 143,145,
147,149
143 A=14:N=5:GOSUB6:A=10:N=7:GOS
UB8:GOTO160
145 A=0:N=14:GOSUB6:N=10:GOSUB8:
GOTO160
147 A=19:N=4:GOSUB6:A=17:N=12:GO
SUB8:GOTO160
149 A=23:N=17:GOSUB6:A=31:N=12:G
OSUB8
160 '
990 'PRINT@Y+139," THE END! ";
995 CLSZ:GOTO10
999 'GOTO999
```

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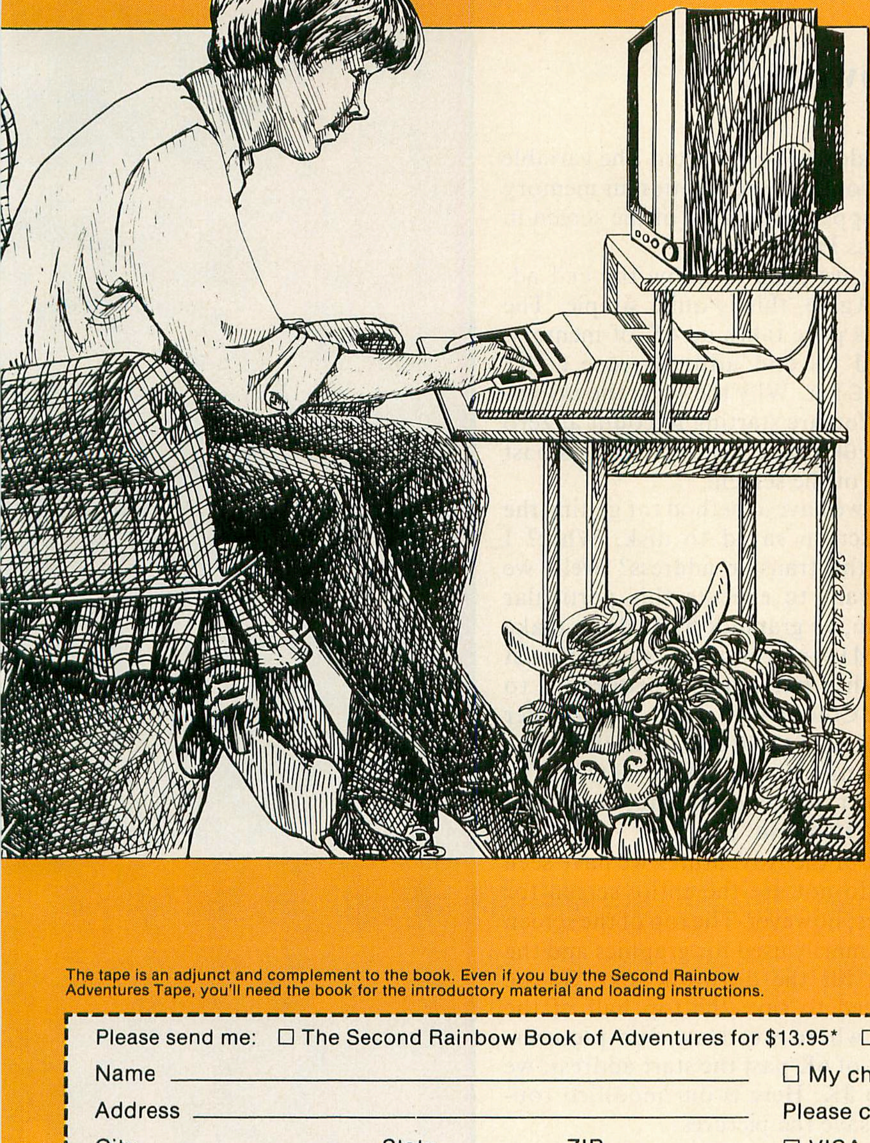

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Create fast, detailed Adventure game graphics

Instant Graphics and Hogs in Space

By Courtney Powers

There have been two main types of Adventure games seen so far in these pages: text Adventures and those combining graphics and text. Text Adventures do not satisfy because they lack what our favorite computer is so famous for — color. An Adventure game with mixed text and graphics that draws the characters on the graphics screen is the best solution.

Doing this in BASIC, however, leaves us with the pictures drawn slowly in front of us or slowly on a graphics page not currently being viewed, leading to long, unexplained delays in the execution of the program. A method I have seldom seen used is the simple expedient of drawing the pictures ahead of time and saving the graphics pages to disk as machine language programs.

The instruction for saving a machine language program, `SAVEM`, requires four items of information: a filename, and the start, end and transfer addresses.

Where is the start of the graphics screen memory? The Color Computer stores the number of 256-byte boundaries to the beginning of the graphics pages in memory location Hex BC. Therefore, `S=PEEK(&HBC)*256` gives us the address we are after. The variable `S` now contains the location in memory of the upper-left corner of the screen in Graphics Page One.

Next, we need to know the end address. Again, this is quite simple. The graphics page takes up 6K of memory. To find its end address, use `E=S+(1024*6)-1`. Why the `-1` in the assignment? You are starting to count at zero here. `S+6K` is one memory address past the end of the screen.

Now we have a method for getting the entire screen saved to disk. What? I forgot the transfer address? Well, we don't want to execute this particular program, as graphics bytes don't make good ML instructions, so we'll just cause this particular "program" to execute Color BASIC. Thus, our transfer address is `T=&HA000`, which is the beginning of our BASIC ROM. To save our picture we merely write `SAVEM`*"filename"*`,S,E,T`.

Most of the Adventures we have seen so far do not use the entire screen for graphics, however. The top of the screen is customarily used for graphics and the bottom for the drawn-in text. So we only need to save the top half of the screen where we draw our pictures. Instead of 6K past the start address, we only go 3K. Here is our modified routine to save the pictures:

```
1000 S=PEEK(&HBC)*256
 1010 SAVEM"filename",S,S
 +1024*3-1,&HA000
```

Courtney Powers is the eldest son of RAINBOW contributor Ron Powers, and is a petty officer in the U.S. Navy. His main interests are computers, medieval combat and playing rock'n'roll piano.

32K
Disk

To get the picture back from disk and onscreen, we merely load the ML program. Type `LOADM`*"filename"*.

In the demo program, I wanted a color similarity to *Sands of Egypt* (blue, orange, black and white), so I could have black space and white stars. However, this color combination is not available in `PMODE 3`.

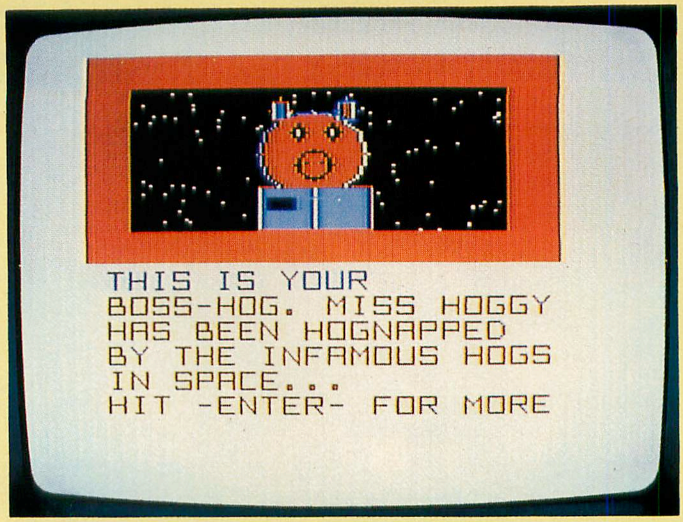
The demo program, `HOG.BAS`, draws the pictures in `PMODE 3` and displays them in `PMODE 4`. Since both modes require the same amount of memory, it is possible to locate the picture in the same memory addresses in both modes and get the color combinations I like.

The interesting things that happen to colors when you save a picture in `PMODE 3` and reload them in `PMODE 4` are gratifying. You can now have four colors in `PMODE 4` without actually going to the trouble of poking each pixel into place!

The manner in which the graphics screen changes will be familiar. You can make your source picture as complicated as you want, and it loads in at the same speed each time — much faster than drawing in real-time.

Another thing we need for a graphics/text mix is a good routine for drawing the letters on the screen. The routine in the demo program does this nicely and can be merged into any program. Use `RENUM` and `MERGE` wherever you like, but the routine does work slightly faster if it is put at the beginning of a program.

To use `HOG.BAS`, first load the program. Then put a formatted, blank disk into the assigned drive. Run the program. You are first quizzed as to the color appearing on the screen. For some unknown reason, the CoCo randomly interchanges the two added colors in `PMODE 4` each time the computer is turned on and off. Therefore, we have to redraw the scenes for each new session.



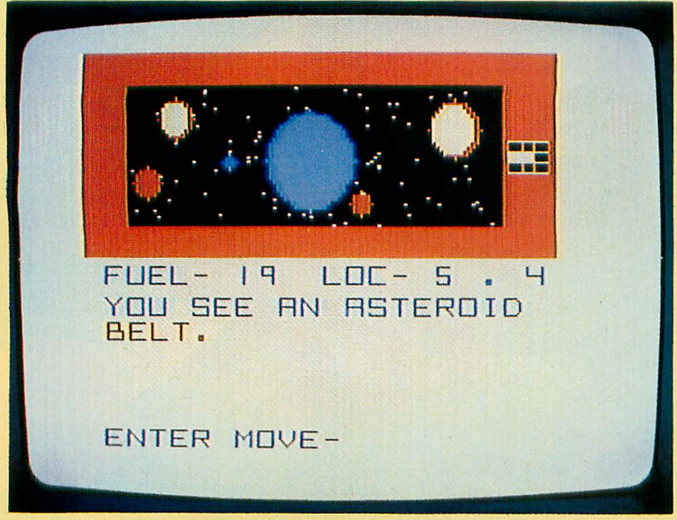
```
THIS IS YOUR
BOSS-HOG. MISS HOGGY
HAS BEEN HOGNAPPED
BY THE INFAMOUS HOGS
IN SPACE...
HIT -ENTER- FOR MORE
```

Once we have ascertained the correct coloring, the computer goes to work drawing the scenes for the game. This is a good time to go to the kitchen for a cup of coffee. To draw all the scenes takes a couple of minutes. A beep informs you when it is done with this task, and you are asked whether you need to go through the instructions or not. I always do, as I find them almost as much fun as the game.

After you have received your instructions, it is a simple "Hunt the Wumpus" type of game with a numbered search grid and inputting coordinates such as 1.2 or 6.6 to go to those places on the grid. A game like this is really much better with graphics, as you can visualize where you are and what you are doing there.

In the demo program, `HOG.BAS`, I have merged the drawing routine into the game program. You could have the drawing routine in a separate program, but this way the blue/orange colors come out correctly each time. However, if you are like me and like to chance it, once you have run the program one time and have the pictures on disk then you can avoid the delay of picture drawing. Just type `RUN 3000` and start playing. If you are lucky, the blue/orange colors will come out right. If not, you must either run the program, press `RESET` and enter `RUN 3000` again, or live with it.

The subroutine that draws the letters on the screen is in lines 40 to 520. This subroutine can be isolated and merged into other programs. To use it, assign location coordinates LX (0-255) and LY (0-191), put the message to be printed in `A$`, and call the routine.



```
FUEL- 19  LOC- 5 . 4
YOU SEE AN ASTEROID
BELT.


ENTER MOVE-
```

At Line 1 we immediately jump to Line 630 to get past our character-drawing routine, and start by making sure our disk drive is prepared. Then we check our color in lines 730 to 770 and assign the color variables `C2` and `C3`. This is essentially the method I have seen Fred Scerbo use in his "Wishing Well" articles. Then, at Line 830 we start drawing our pictures and saving each one to disk as a machine language program.

At Line 3000, our pictures drawn, we ask the player whether he wants to go through the instruction sequence. If the player chooses immediate play, we branch to Line 4000 and the start of the game. If not, we go through an instruction sequence that consists of just loading in the pictures and showing the instructions. From Line 4030 to Line 4370 we prepare the game by setting up initial conditions.

Starting at Line 5030 (the top of the main loop) we draw in the picture appropriate to our current location, draw a "gravitonic detector," and fill in blocks to show nearby objects. At lines 5380 and 5390 we check to see if the player has won or lost the game. Then at Line 5430 we get the player's move, and go back to the top of the main loop at Line 5670.

The routine that prints a message appropriate to each location is in lines 6010 through 6130. The "win game" routine is in lines 6170 to 6280, and the "lose game" routine is in lines 7030 to 7140. The infamous `INKEY` subroutine is in Line 19999, ending our program.

The main purpose of all this is to provide you with the tools to construct an Adventure game that gives you a professional-looking picture change, and to get rid of all those awful text Adventures. Put in some graphics that make us proud. Let the games begin!

(Questions about this article can be addressed to the author at Rt. 1, Box 43, Davenport, ND 58021. Please enclose an SASE for a response.) ☐

170	247	3200	63
310	234	3380	104
480	85	4030	117
720	232	4330	228
940	54	5160	210
1190	30	5380	215
1470	118	5610	121
1740	4	6090	227
1990	151	6270	148
2240	48	END	29
3000	10		

The listing: HOGSPACE

```
1 GOTO 630
2 SAVE"HOG":STOP
10 REM**************************
20 REM START DRAW LETTERS SUB
30 REM**************************
40 PLAY"T255;O2":FOR LP=1 TO LEN
(A$):LI$=MID$(A$,LP,1):LI=ASC(LI
$)-64
50 LX=LX+12:IF LX>246 THEN LX=0:
LY=LY+12
60 IF LI=-19 THEN LI=28
70 IF LI=-18 THEN LI=29
80 IF LI>-17 AND LI<-6 THEN LINE
(LX,LY)-(LX,LY),PRESET:GOSUB 420
90 IF LI<0 THEN LI=27
100 DRAW"BM"+STR$(LX)+","+STR$(L
Y):ON LI GOSUB 130,140,150,160,1
70,180,190,200,210,220,230,240,2
50,260,270,280,290,300,310,320,3
30,340,350,360,370,380,390,400,4
10
110 PLAY"G"
120 NEXT LP:RETURN
130 DRAW"BM+0,+0;ND8R8D4NL8D4":R
ETURN 'A
140 DRAW"BM+0,+0;ND8R6D4NL6R2D4L
8":RETURN 'B
150 DRAW"BM+0,+0;NR8D8R8":RETURN
 'C
160 DRAW"BM+0,+0;ND8R6F2D4G2L6":
RETURN 'D
170 DRAW"BM+0,+0;NR8D4NR6D4R8":R
ETURN 'E
180 DRAW"BM+0,+0;NR8D4NR6D4":RET
URN 'F
190 DRAW"BM+0,+0;NR8D8R8U4L3":RE
TURN 'G
200 DRAW"BM+0,+0;D4ND4R8U4D8":RE
TURN 'H
210 DRAW"BM+4,+0;L2R4L2D8L2R4":R
ETURN 'I
```

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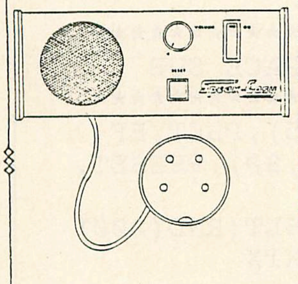

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30 GOTO 10

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```
220 DRAW"BM+0,+0;BR6D8L4U2":RETU
RN 'J
230 DRAW"BM+0,+0;D8U4R2NE4NF4":R
ETURN 'K
240 DRAW"BM+0,+0;D8R8":RETURN 'L
250 DRAW"BM+0,+0;ND8F4E4D8":RETU
RN 'M
260 DRAW"BM+0,+0;ND8NF8BR8D8":RE
TURN 'N
270 DRAW"BM+0,+0;D8R8U8L8":RETUR
N 'O
280 DRAW"BM+0,+0;ND8R8D4L8":RETU
RN 'P
290 DRAW"BM+0,+0;R8D8NH3NF2L8U8"
:RETURN 'Q
300 DRAW"BM+0,+0;R8D4L4NF4L4D4U8
":RETURN 'R
310 DRAW"BM+0,+0;R8D1U1L8D4R8D4L
8U1":RETURN 'S
320 DRAW"BM+0,+0;R4ND8R4":RETURN
 'T
330 DRAW"BM+0,+0;D8R8U8":RETURN
'U
340 DRAW"BM+0,+0;D4F4E4U4":RETUR
N 'V
350 DRAW"BM+0,+0;D6F2E2NU4F2E2U6
":RETURN 'W
360 DRAW"BM+0,+0;F8BL8E8":RETURN
 'X
370 DRAW"BM+0,+0;F4ND4E4":RETURN
 'Y
380 DRAW"BM+0,+0;R8G8R8":RETURN
'Z
390 RETURN 'SPACEBAR
400 DRAW"BM+1,+4;R6":RETURN 'DAS
H
410 DRAW"BM+2,+6;D2R2U2L2":RETUR
N ' PERIOD
420 LI=LI+17:ON LI GOSUB 430,440
,450,460,470,480,490,500,510,520
:LI=LI-17:RETURN 'THE NUMBERS
430 DRAW"BM+0,+0;R8D8L8U8R8G8":R
ETURN 'ZERO
440 DRAW"BM+4,+0;D8N":RETURN '1
450 DRAW"BM+0,+0;ND2R8D4L8D4R8":
RETURN '2
460 DRAW"BM+0,+0;R8D4NL6D4L8":RE
TURN '3
470 DRAW"D4R8U4D8":RETURN '4
480 DRAW"NR6D4R6D4L6U1":RETURN '
5
490 DRAW"NR8D8R8U4L8":RETURN '6
500 DRAW"BD8BR8U8L6D2":RETURN '7
510 DRAW"BR2R6D4L6NU4D4R6U4":RET
URN '8
520 DRAW"BR2ND4R6D4NL6D4":RETURN
 '9
530 REM*************************
```

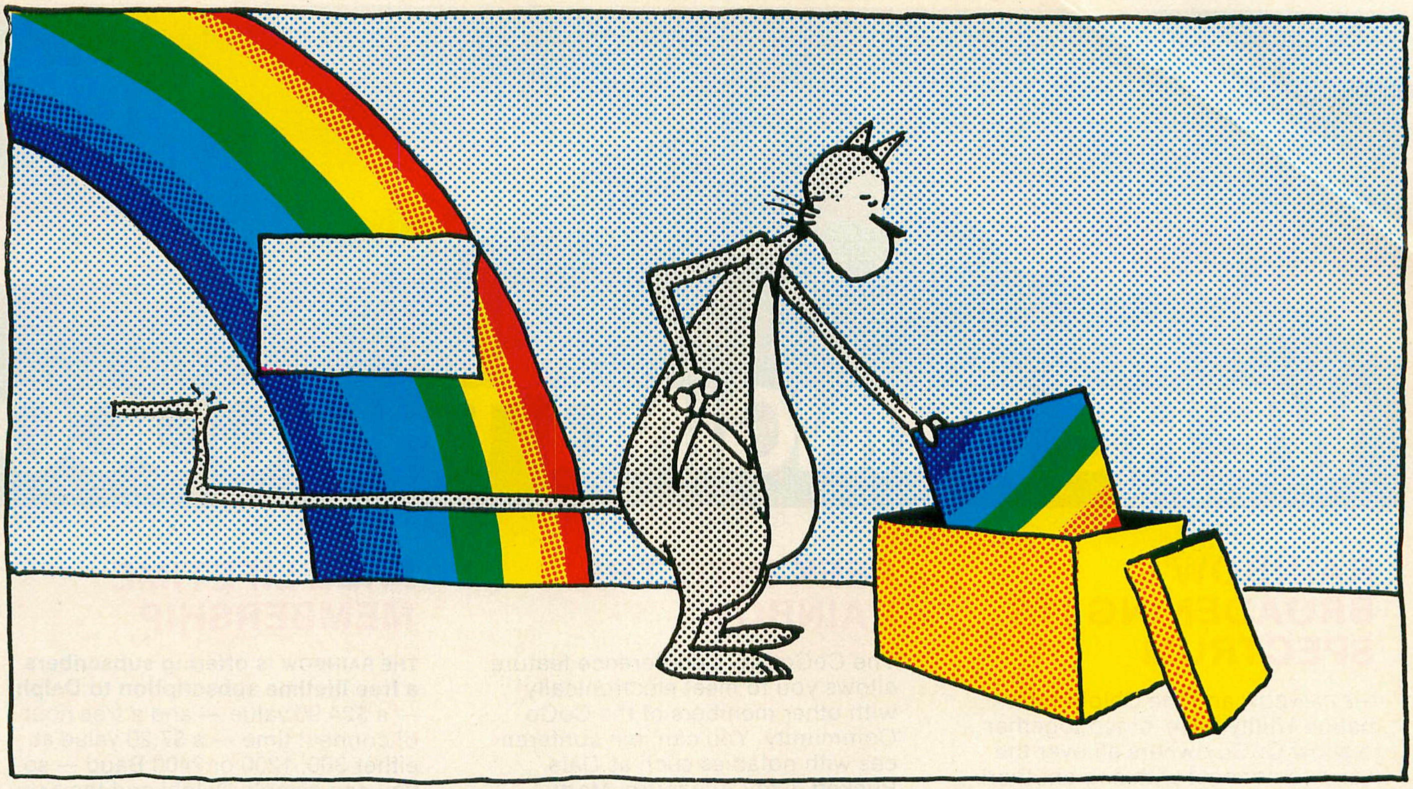
```
540 REM END OF DRAW LETTERS SUB
550 REM************************
600 REM************************
610 REM START DRAW PROGRAM
620 REM************************
630 CLS:PRINT"THIS PROGRAM WILL
WRITE TO DISK!YOU SHOULD HAVE A
BLANK AND    FORMATTED DISKETTE
 OR A DISK YOUHAVE ALREADY RUN T
HIS PROGRAM ONIN PLACE. DO YOU S
TILL WANT TO  CONTINUE?"
640 GOSUB 19999
650 IF X$<>"Y" THEN END
660 SAVE"HOG"
670 PCLEAR4
680 PCLS:PMODE3,1
690 COLOR 3,1:SCREEN 1,0:PCLS
700 REM*************************
710 REM CHECK FOR CORRECT COLOR
720 REM*************************
"CHECK",S,S+1024*3-1,&HA000:PMOD
E4,1:COLOR1,0:SCREEN1,1:PCLS:LOA
DM"CHECK":KILL"CHECK/BIN"
740 A$="IF SCREEN IS BLUE    THE
N HIT -B- KEY. IF SCREEN IS ORAN
GE     THEN HIT -O- KEY."
750 LX=-1:LY=100
760 GOSUB 40
770 X$=INKEY$:IFX$="B" THEN C2=3
:C3=2 ELSE IF X$="O" THEN C2=2:C
3=3 ELSE 770
800 REM************************
810 REM START DRAWING PICTURES
820 REM************************
830 PCLS:PMODE3,1:SCREEN1,0:COLO
RC2,1
840 CLS:PRINT@97,"DRAWING PICTUR
ES-WAIT PLEASE."
850 GOSUB 900
860 GOTO970
870 REM************************
880 REM DRAW EMPTY SPACE SUB
890 REM************************
900 LINE(0,0)-(256,95),PSET,BF
910 LINE(25,15)-(225,80),PRESET,
BF
920 FOR X=1 TO 100:PSET(RND(200)
+25,RND(65)+15,0):NEXTX
930 RETURN
940 REM*************************
950 REM SAVING EMPTY SPACE
960 REM*************************
970 S=PEEK(&HBC)*256
980 SAVEM"EMPTY",S,S+1024*3-1,&H
A000
990 REM************************
1000 REM DRAW AND SAVE SUN
1010 REM************************
```

```
1020 PCLS
1030 GOSUB 900
1040 CIRCLE(175,48),40,C2,.8
1050 PAINT(175,48),0,C2
1060 SAVEM"SUN",S,S+1024*3-1,&HA
000
1070 REM*************************
1080 REM DRAW AND SAVE STATION
1090 REM*************************
1100 PCLS
1110 GOSUB 900
1120 CIRCLE(125,50),20,C3
1130 CIRCLE(125,50),30,C3
1140 PAINT(125,75),C3,C3
1150 LINE(105,45)-(145,55),PSET,
BF
1160 LINE(120,30)-(130,70),PSET,
BF
1170 CIRCLE(125,50),10,C3
1180 PAINT(125,50),C3,C3
1190 SAVEM"STATION",S,S+1024*3-1
,&HA000
1200 REM*************************
1210 REM DRAW ASTEROIDS
1220 REM*************************
1230 PCLS
1240 GOSUB 900
1250 CIRCLE(35,60),8,C2
1260 PAINT(35,60),C2,C2
1270 CIRCLE(50,30),10,C2
1280 PAINT(50,30),0,C2
1290 CIRCLE(80,50),4,C3
1300 PAINT(80,50),C3,C3
1310 CIRCLE(125,50),25,C3
1320 PAINT(125,50),C3,C3
1330 CIRCLE(150,70),7,C2
1340 PAINT(150,70),C2,C2
1350 CIRCLE(200,35),15,C2
1360 PAINT(200,35),0,C2
1370 SAVEM"ASTEROID",S,S+1024*3-
1,&HA000
1380 REM*************************
1390 REM DRAW BOSS-HOG
1400 REM*************************
1410 PCLS
1420 GOSUB 900
1430 LINE(95,60)-(155,80),PSET,B
1440 PAINT(126,61),C3,C2
1450 LINE(125,60)-(125,80),PSET
1460 LINE(100,65)-(115,70),PRESE
T,BF
1470 CIRCLE(125,45),30,C3,.7
1480 PAINT(125,45),C2,C3
1490 CIRCLE(125,50),10,1,.8
1500 CIRCLE(121,49),1,1
1510 CIRCLE(128,49),1,1
1520 CIRCLE(106,25),6,C2
1530 PAINT(108,25),C3,C2
```

```
1540 CIRCLE(142,25),6,C3
1550 PAINT(142,25),C2,C3
1560 CIRCLE(116,35),4,1
1570 PAINT(116,35),0,1
1580 CIRCLE(134,35),4,1
1590 PAINT(134,35),0,1
1600 SAVEM"BOSSHOG",S,S+1024*3-1
,&HA000
1610 REM************************
1620 REM SAVE BLANK TEXT SCRN
1630 REM************************
1640 PCLS4
1650 SAVEM"CLS",S+1024*3,S+1024*
6-1,&HA000
1660 REM*************************
1670 REM DRAW PLANET OPENMIND
1680 REM*************************
1690 PCLS
1700 GOSUB 900
1710 CIRCLE(100,47),30,C2,.8
1720 PAINT(100,47),C3,C2
1730 CIRCLE(95,40),10,0,.4
1740 PAINT(95,40),0,0
1750 CIRCLE(105,57),10,0,.4
1760 PAINT(105,57),0,0
1770 SAVEM"OPENMIND",S,S+1024*3-
1,&HA000
1780 REM*************************
1790 REM DRAWING PLANET HIPPO
1800 REM*************************
1810 PCLS
1820 GOSUB 900
1830 CIRCLE(150,50),40,C2,.7
1840 PAINT(150,50),C2,C2
1850 LINE(105,70)-(195,70),PRESE
T
1860 LINE(105,60)-(195,60),PRESE
T
1870 LINE(105,50)-(195,50),PRESE
T
1880 LINE(105,40)-(195,40),PRESE
T
1890 LINE(105,30)-(195,30),PRESE
T
1900 PAINT(150,29),C3,1
1910 PAINT(150,45),C3,1
1920 PAINT(150,65),C3,1
1930 SAVEM"HIPPO",S,S+1024*3-1,&
HA000
1940 REM*************************
1950 REM DRAW SWEDISH PLANET
1960 REM*************************
1970 PCLS
1980 GOSUB 900
1990 CIRCLE(100,50),30,C2,.8
2000 PAINT(100,50),0,C2
2010 DRAW"BM80,55;U8R4D4U4R4D8"
2020 DRAW"BM+4,+0;U8R6D8L6"
```

```
2030 DRAW"BM+10,+0;U8R6D4L4R6D4"
2040 DRAW"BM+4,+0;U8D4R6U4D4R2D4
"
2050 SAVEM"SWEDISH",S,S+1024*3-1
,&HA000
2060 REM************************
2070 REM DRAWING DOG PLANET
2080 REM************************
2090 PCLS:GOSUB 900
2100 CIRCLE(90,45),25,3,.8
2110 PAINT(90,45),2,3
2120 SAVEM"DOGS",S,S+1024*3-1,&H
A000
2130 REM************************
2140 REM DRAWING HOG KISS
2150 REM************************
2160 PCLS:GOSUB900
2170 CIRCLE(125,50),45,C2,.6
2180 CIRCLE(125,50),45,C2,.3
2190 PAINT(125,50),0,C2
2200 CIRCLE(125,50),80,C2,.7
2210 PAINT(125,35),C3,C2
2220 PAINT(125,65),C3,C2
2230 PAINT(60,50),C2,C2
2240 LX=90:LY=45:A$="KISS"
2250 GOSUB 40
2260 SAVEM"KISS",S,S+1024*3-1,&H
A000
2270 REM************************
2280 REM DRAW GRAVE FOR DEAD
2290 REM************************
2300 PCLS
2310 LINE(0,0)-(256,95),PSET,BF
2320 OX=0:OY=35:FOR X=1 TO 256 S
TEP 8:Y=35+RND(20)-10:LINE(OX,OY
)-(X,Y),PRESET:OX=X:OY=Y:NEXT X:
LINE(OX,OY)-(256,35),PRESET
2330 PAINT(1,1),1,1
2340 FOR X=1 TO 100:PSET(RND(256
),RND(40),0):NEXTX
2350 PAINT(5,90),C3,1
2360 LINE(85,55)-(168,80),PRESET
,B
2370 PAINT(100,70),C2,1
2380 LINE(90,60)-(160,75),PRESET
,B
2390 LX=87:LY=64:DRAW"C1":A$="R
I P":GOSUB40
2400 DRAW"BM85,80;F50;R83;H50"
2410 PAINT(100,90),1,1
2420 S=PEEK(&HBC)*256:SAVEM"DEAD
",S,S+1024*3-1,&HA000
2430 REM************************
2440 REM END OF PICTURE DRAWING
2450 REM************************
3000 SOUND1,4:CLS:PRINT"DO YOU N
EED INSTRUCTIONS?":GOSUB 19999:I
F X$="Y" THEN 3040 ELSE 4000
```

```
3010 REM***********************
3020 REM INSTRUCTION SEQUENCE
3030 REM***********************
3040 PCLEAR 4
3050 PCLS:PMODE4,1
3060 COLOR 0,1:SCREEN 1,1:PCLS
3070 REM***********************
3080 REM SHOW EMPTY VIEWSCREEN
3090 REM***********************
3100 LOADM"EMPTY"
3110 LX=-1:LY=100
3120 A$="YOU ARE BEING CALLED ON
 THE INTERSPACE     TELCOMMER...
        HIT -ENTER- TO       ANS
WER."
3130 PLAY"O1;T100;ABABABABABABAB
"
3140 GOSUB 40
3150 GOSUB 19999
3160 GOSUB 3520
3170 REM***********************
3180 REM BOSS HOG COMES ONSCRN
3190 REM***********************
3200 LOADM"BOSSHOG"
3210 A$="THIS IS YOUR        BO
SS-HOG. MISS HOGGY HAS BEEN HOGN
APPED   BY THE INFAMOUS HOGS IN
SPACE...          HIT -ENTER- FO
R MORE"
3220 GOSUB 40
3230 GOSUB 19999
3240 A$="YOU ARE BUT A FROG-  MA
N FROM PLANET      SWAMP BUT YOU
 ARE    ALL WE HAVE. YOU ARE TO
GO TO...          HIT -ENTER- FO
R MORE"
3250 GOSUB 3520
3260 GOSUB 40
3270 GOSUB 19999
3280 GOSUB 3520
3290 A$="THE CO-ORDINATES I   AM
 NOW SENDING TO    YOUR NAV-COMP
UTER.   HIT -ENTER- FOR MORE"
3300 GOSUB 40
3310 GOSUB 19999
3320 GOSUB 3520
3330 A$="YOU MOVE AROUND THE  ST
AR SYSTEM BY INPUT -TING DATA ON
 YOUR   NAV-COMPUTER.  FOR   EXA
MPLE-            HIT -ENTER- FO
R MORE"
3340 GOSUB 40
3350 GOSUB 19999
3360 GOSUB 3520
3370 A$="MOVE- 3.4 WOULD MOVE YO
U TO A LOCATION    RIGHT 3 AND D
OWN 4   FROM THE UPPER LEFT   OF
THE SEARCH GRID.  THE GRID COVER
```



HOW DO YOU GIVE A RAINBOW?

It's simple — Give a RAINBOW gift certificate . . .

Let a gift subscription to THE RAINBOW carry the premier Color Computer magazine right to your friends' doorsteps. THE RAINBOW is *the* information source for the Tandy Color Computer.

Each month, your friends will enjoy the intelligent programs, reviews and articles written exclusively for their CoCo.

First, your gift will be announced in a handsome card. Then, all year 'round, they'll remember you and your thoughtfulness when they get each edition of THE RAINBOW — more than 200 pages loaded with as many as 24 programs, 15 regular columns and lots of helpful hints and tips.

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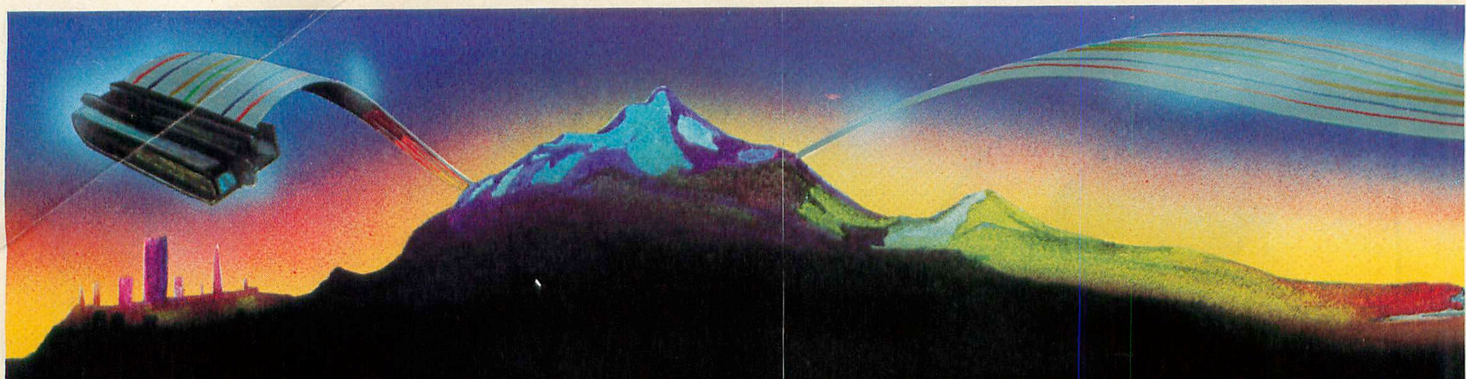


WE'RE BRINGING THE COCO

RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $20 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $24.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $32.15 value as a ***free bonus!***

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our $31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

Want to save even more? While you're online you can order, for only $29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* ($21.95) and a total of three hours of connect time ($21.60).

Delphi provides us all with **Immediate CoCo Community**. Check it out today. After all, you can sample it for free!

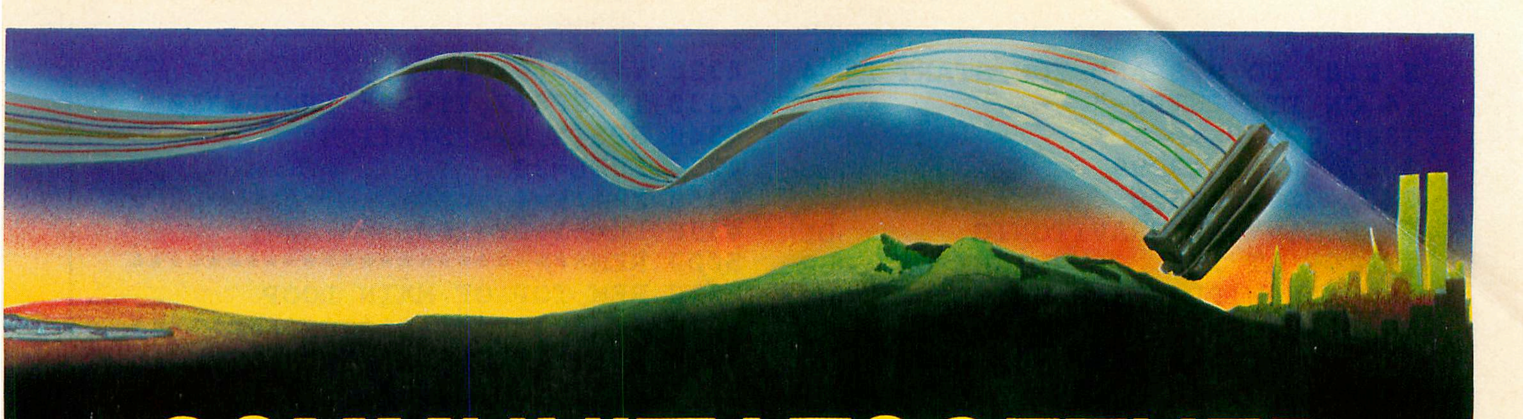
Problems? Call Delphi:

(800) 544-4005

(617) 491-3393

DELPHI TYPE:

GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $12 (U.S.) per hour.

On Telenet: The Uninet network has now merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call your local access number and make connection, press the ENTER key twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type `C DELPHI` and press ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi's new rates indicate an additional $12 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 312561703088 through Telenet, or 310600601500 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `RAINBOWSUB` and press ENTER. At the "PASSWORD:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `RAINBOWORDER` and press ENTER. At the "PASSWORD:" prompt, type `SENDSUB` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just press `ENTER` and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password. No time is assessed against your free hour of service while you answer these questions.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**

```
S 0.0  TO 8.8 AND YOU START AT 4
.4 ON IT.-ENTER-"
3380 GOSUB 40
3390 GOSUB 19999
3400 GOSUB 3520
3410 A$="THE GRAVITONIC        DE
TECTOR AT THE      RIGHT OF YOUR
 SCREEN WILL FLASH WHITE TO  SHO
W NEARBY GRAVITY  SOURCES...
      HIT -ENTER- FOR MORE"
3420 GOSUB 40
3430 GOSUB 19999
3440 GOSUB 3520
3450 A$="REMEMBER- MISS HOGGY IS
 DEPENDING ON YOU. GOOD LUCK-KER
VIT.   HIT -ENTER- TO        ACT
IVATE WARP..."
3460 GOSUB 40
3470 GOSUB 19999
3480 GOTO4000
3490 REM***********************
3500 REM CLS SCREEN BOTTOM SUB
3510 REM***********************
3520 LOADM"CLS":LX=-1:LY=100:RET
URN
4000 REM************************
4010 REM SET UP AND START GAME
4020 REM************************
4030 PCLEAR 4
4040 PCLS:PMODE4,1
4050 COLOR 0,1:SCREEN 1,1:PCLS
4060 DIMSP$(8,8)
4070 SP$(4,4)="SUN"
4080 REM************************
4090 REM FILL ARRAY WITH PLANETS
4100 REM************************
4110 FORZ=1 TO 4
4120 X=RND(9)-1
4130 Y=RND(9)-1
4140 IF SP$(X,Y)<>"" THEN 4120
4150 READ P$
4160 SP$(X,Y)=P$
4170 NEXT Z
4180 DATA OPENMIND,HIPPO,SWEDISH
,DOGS
4190 REM************************
4200 REM FILL ARRAY W/ ASTEROIDS
4210 REM************************
4220 FOR Z=1 TO 8
4230 X=RND(9)-1
4240 Y=RND(9)-1
4250 IF SP$(X,Y)<>"" THEN 4230
4260 SP$(X,Y)="ASTEROID"
4270 NEXT Z
4280 REM************************
4290 REM PUT HOGULA-1 IN ARRAY
4300 REM************************
4310 X=RND(9)-1
```

```
4320 Y=RND(9)-1
4330 IF SP$(X,Y)<>"" THEN 4310
4340 SP$(X,Y)="STATION"
4350 FUEL=20
4360 X=4:Y=4
4370 LX=-1:LY=100
5000 REM************************
5010 REM TOP OF MAIN LOOP
5020 REM************************
5030 PCLS:IF SP$(X,Y)="" THEN LO
ADM"EMPTY":GOTO5050
5040 LOADM SP$(X,Y) 'GET PIC.
5050 A$="FUEL-"+STR$(FUEL)+"  LO
C-"+STR$(X)+" ."+STR$(Y)
5060 LOADM"CLS"
5070 GOSUB 40
5075 GOSUB 6030
5080 REM***********************
5090 REM DRAW LOCATOR GRID
5100 REM***********************
5110 LINE(230,40)-(250,55),PSET,
BF
5120 LINE(229,40)-(251,55),PRESE
T,B
5130 LINE(230,45)-(250,45),PRESE
T
5140 LINE(230,50)-(250,50),PRESE
T
5150 LINE(237,41)-(237,54),PRESE
T
5160 LINE(243,41)-(243,54),PRESE
T
5170 REM***********************
5180 REM PAINT IN LOCATED ITEMS
5190 REM***********************
5200 IF X=8 THEN 5220
5210 IF SP$(X+1,Y)<>"" THEN PAIN
T(244,46),1,1
5220 IF Y=8 THEN 5240
5230 IF SP$(X,Y+1)<>"" THEN PAIN
T(238,51),1,1
5240 IF X=0 THEN 5260
5250 IF SP$(X-1,Y)<>"" THEN PAIN
T(231,46),1,1
5260 IF Y=0 THEN 5280
5270 IF SP$(X,Y-1)<>"" THEN PAIN
T(238,41),1,1
5280 IF X=8 OR Y=8 THEN 5300
5290 IF SP$(X+1,Y+1)<>"" THEN PA
INT(244,51),1,1
5300 IF X=8 OR Y=0 THEN 5320
5310 IF SP$(X+1,Y-1)<>"" THEN PA
INT(244,41),1,1
5320 IF X=0 OR Y=8 THEN 5340
5330 IF SP$(X-1,Y+1)<>"" THEN PA
INT(231,51),1,1
5340 IF X=0 OR Y=0 THEN 5360
5350 IF SP$(X-1,Y-1)<>"" THEN PA
```

```
INT(231,41),1,1
5360 IF SP$(X,Y)<>"" THEN PAINT(
238,46),1,1
5370 IF SP$(X,Y)<>"" THEN PAINT(
238,46),1,1
5380 IF SP$(X,Y)="STATION" THEN
6170
5390 IF FUEL=0 THEN 7030
5400 REM************************
5410 REM GET PLAYER MOVE
5420 REM************************
5430 A$="ENTER MOVE-"
5440 LX=-1:LY=180
5450 GOSUB 40
5460 M$=""
5470 FOR X=1 TO 3
5480 GOSUB 19999
5490 IF INSTR(1,".123456780",X$)
=0 THEN SOUND 1,5:GOTO5480
5500 IF X<>2 AND X$="." THEN SOU
ND 1,5:GOTO5480
5510 IF X=2 AND X$<>"." THEN SOU
ND 1,5:GOTO5480
5520 A$=X$
5530 GOSUB 40
5540 M$=M$+X$
5550 NEXT X
5560 REM************************
5570 REM INTERPRET MOVE
5580 REM************************
5590 LOADM"CLS"  'CLEAR TEXT
5600 Y=VAL(RIGHT$(M$,1))
5610 X=VAL(LEFT$(M$,1))
5620 A$="WARPING OUT..."
5630 LY=100:LX=-1
5640 FUEL=FUEL-1
5650 GOSUB 40
5660 LX=-1:LY=100
5670 GOTO5030
5680 REM************************
5690 REM BOTTOM OF MAIN LOOP
5700 REM************************
5710 REM
6000 REM************************
6010 REM PRINT MESSAGE ROUTINE
6020 REM************************
6030 IF SP$(X,Y)="SUN" THEN A$="
YOU SEE THE HOGULA-1 SYSTEM SUN.
"
6040 IF SP$(X,Y)="ASTEROID" THEN
 A$="YOU SEE AN ASTEROID  BELT."
6050 IF SP$(X,Y)="" THEN A$="YOU
 ARE IN EMPTY      SPACE."
6060 IF SP$(X,Y)="STATION" THEN
A$="YOU HAVE FOUND SPACE STATION
 HOGULA-ONE!"
6070 IF SP$(X,Y)="OPENMIND" THEN
 A$="YOU SEE THE PLANET   OF OPE
N MINDED STEW- ARDESSES..."
6080 IF SP$(X,Y)="HIPPO" THEN A$
="YOU SEE THE PLANET   OF HIPPO-
BALLERINAS! -HEAVY-"
6090 IF SP$(X,Y)="DOGS" THEN A$=
"YOU SEE THE DOG        PLANET. TH
EY ARE      QUITE -SIRIUS- ABOUT
IT."
6100 IF SP$(X,Y)="SWEDISH" THEN
A$="YOU SEE THE PLANET   OF SWED
ISH CHEFS.   THEY ARE SERVING
    FROGLEGS TODAY...    MORK-MOR
K-MORK..."
6110 LX=-1:LY=115
6120 GOSUB 40
6130 RETURN
6140 REM************************
6150 REM MISS HOGGY IS FOUND!
6160 REM************************
6170 LOADM"CLS"
6180 A$="YOU HEAR A DISTRESS  CA
LL FROM THE SPACE  STATION. IT I
S MISS  HOGGY..."
6190 LX=-1:LY=100
6200 GOSUB 40
6210 FOR X=1 TO 1000:NEXTX
6220 LOADM"KISS"
6230 FOR X=1 TO 100
6240 IF X/2=INT(X/2) THEN SCREEN
 1,1 ELSE SCREEN 1,0
6250 PLAY"T255;O5;ABC"
6260 NEXTX
6270 CLS:PRINT"THE GRATITUDE OF
MISS HOGGY IS  TRULY OVERWHELMIN
G.....                PLAY AGAIN";
6280 INPUT X$:IF LEFT$(X$,1)="Y"
 THEN 4030 ELSE END
7000 REM************************
7010 REM RUN OUT OF FUEL-DIE!
7020 REM************************
7030 LOADM"CLS"
7040 A$="YOU HAVE RUN OUT OF  FU
EL..."
7050 LX=-1:LY=100
7060 GOSUB 40
7070 FOR X=1 TO 1000:NEXTX
7080 LOADM"DEAD"
7090 A$="ANOTHER FROG BITES    TH
E DUST..."
7100 LOADM"CLS"
7110 LX=-1:LY=100
7120 GOSUB 40
7130 FOR X=1TO5000:NEXTX
7140 CLS:INPUT"WANT TO TRY AGAIN
??";X$:IF LEFT$(X$,1)="Y" THEN 4
030 ELSE END
19999 X$=INKEY$:IFX$="" THEN 199
99 ELSE RETURN
```

TOM MIX'S MINI-CATALOG

Educational Best-Sellers!

Teachers Database II—Allows teachers to keep computerized files of students. Recently updated with many new features!

- Up to 100 students, 24 items per student
- Many easy-to-follow menus
- Records can be changed, deleted, combined
- Statistical analysis of scores
- Grades can be weighed, averaged, percentaged
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NOW AVAILABLE FOR IBM PC & COMPATIBLES-Holds information on up to 250 students with as many as 60 individual items of data for each. Contains the features listed above PLUS.

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32K Ext. Basic
Tape $24.95 Disk $29.95

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Requires 16K Ext. Basic/
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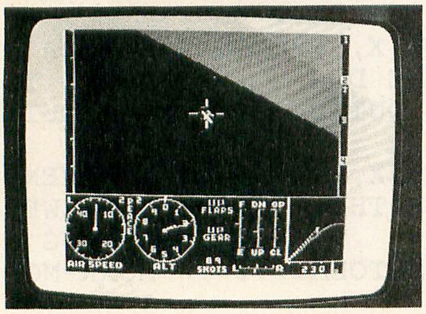
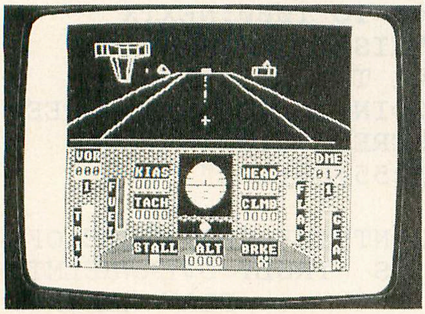
Tape $30.95 Disk $35.95



* P-51 Mustang Attack/Flight Simulation

The ultimate video experience! Link two CoCo's together by cable or modem, and compete against your opponent across the table OR across the country! (Both computers require a copy of this program). The P-51 flight simulator lets you fly this WWII attack fighter in actual combat situations—against another player OR against the computer.

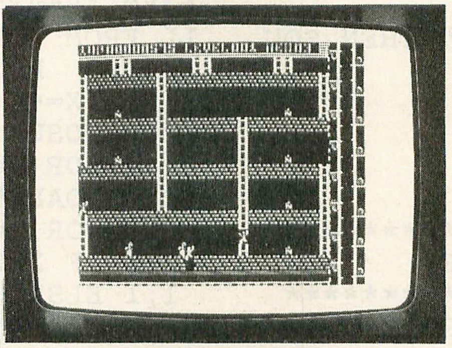
32K Machine Language
Flight Manual Included
Tape $29.95 Disk $34.95



* Worlds of Flight Small Plane Simulation

Real-time simulation generates panoramic 3-D views of ground features as you fly your sophisticated plane in any of nine different "worlds." Program models over 35 different aircraft/flight parameters. Realistic sound effects too! *Manual* included helps you through a typical short flight.

32K Machine Language
Flight Manual Included
Joysticks Required
Tape $29.95 Disk $34.95



* NEW RELEASE GOLD FINDER

Here's the quality you have come to expect from TOM MIX. Another outstanding color computer game. This one ranks right up there with "Donkey Kong". Listen to this: 69 levels for one or two players PLUS you can create your own levels (up to 306 on a disk). Endless possibilities await you in this exciting new creation. Move over Goldrunner and Loderunner, here comes GOLD FINDER. . .

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Disk $27.95

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Unique Utilities!

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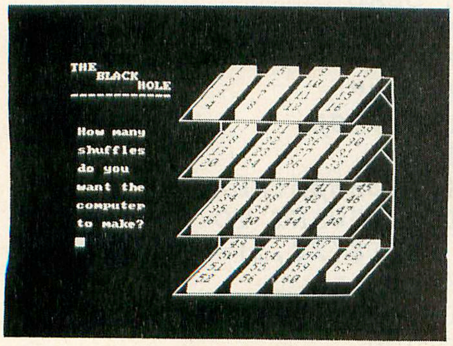

```
THE BLACK HOLE
--------------

How many
shuffles
do you
want the
computer
to make?
```

NEW RELEASE THE BLACK HOLE

For anyone who enjoys solving a challenging logical puzzle, here is a 3-dimensional puzzle composed of 63 numbered cubes in a 4 by 4 by 4 array that leaves one BLACK HOLE. You tell the computer to sort the cubes and the computer tells you to put them in numerical order. A real brain bender. Outstanding color and action. Years of entertainment. . .

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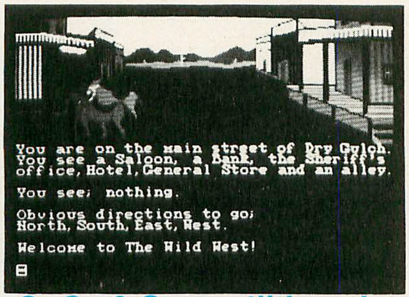
You are on the main street of Dry Gulch. You see a Saloon, a bank, the Sheriff's office, Hotel, General Store and an alley.

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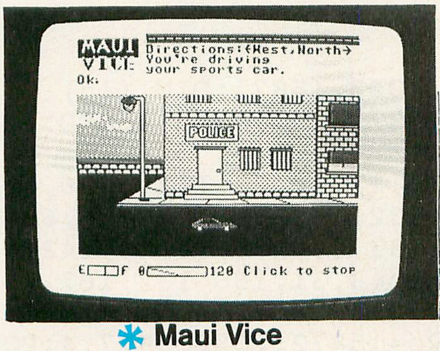

Directions:(West,North)
You're driving your sports car.
Ok:

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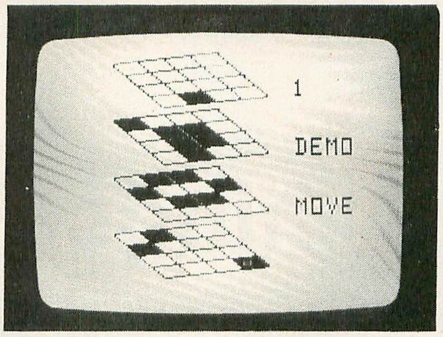

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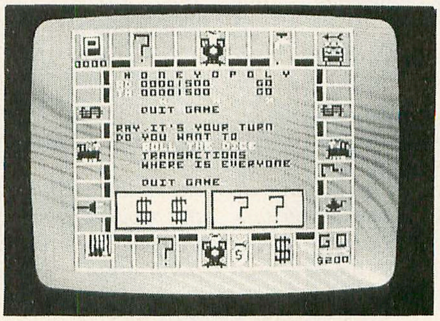

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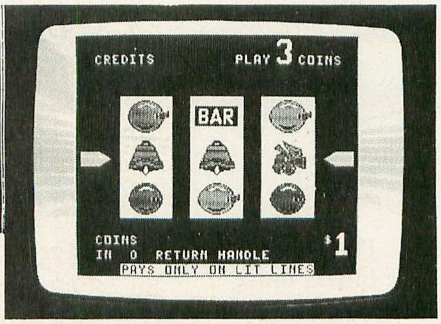

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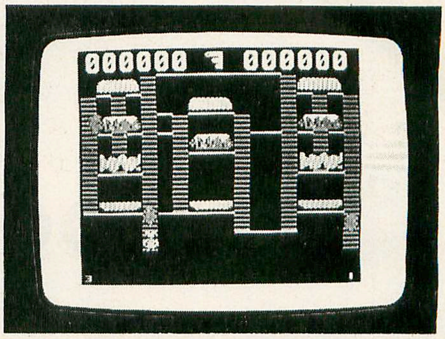

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THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" will contain shorter BASIC program listings that will entertain and help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Contributions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and will be useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we do not have the time to key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

— Jutta Kapfhammer
Submissions Editor

Fun And Games

16K
ECB

Hand-Me-Downs

By David Hutchinson

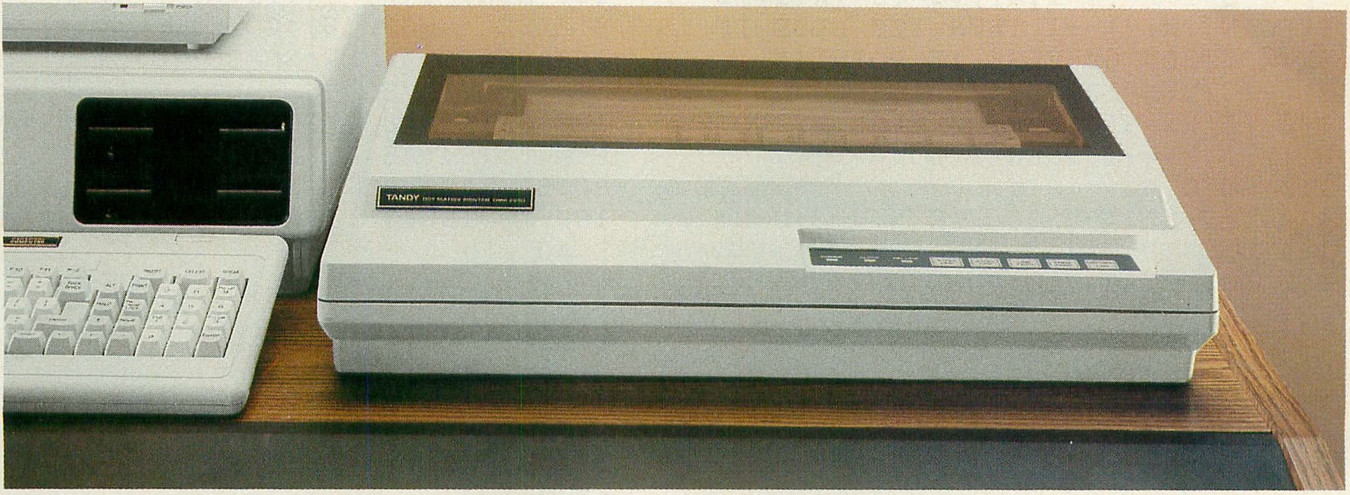
Hand Off is a simple, but challenging game. The object is to pass a ball from one block to another as the blocks move vertically in opposite directions across the screen. The ball starts in the block in the top row and the block moves rapidly across the screen in one direction while the block in the row underneath moves across the screen in the other direction.

To pass a ball down, press any key at the exact moment the blocks meet. To accomplish a win, the ball must be passed all the way to the block at the bottom. The faster the ball is moved to the bottom, the better the score.

The listing: HAND OFF

```
10 CLEAR 1000,15871:DIMI(15)
20 FORC=15872 TO 15916:READD:POK
EC,D:NEXTC
30 DATA 16,142,0,31,142,4,96,230
,128,166,132,167,31,48,1,49,63,3
8,246,231,31,48,136,31,16,142,0,
31,230,132,48,31,166,132,167,1,4
8,31,49,63,38,246,231,1,57
40 DEFUSR0=15872:POKE15877,4:POK
E15878,0:U=4:V=0:W=0:SC=2500:Q=0
:TIMER=0:CLS(0)
50 FORX=0TO14:Y=RND(31):P=(X*32)
+Y:I(X)=Y:PRINT@P," ";:NEXTX:PRI
NT@I(0),".";
60 A=USR0(0):I(W)=I(W)-1:IFI(W)<
0THENI(W)=31
70 I(W+1)=I(W+1)+1:IFI(W+1)>31TH
```

Next to your computer,



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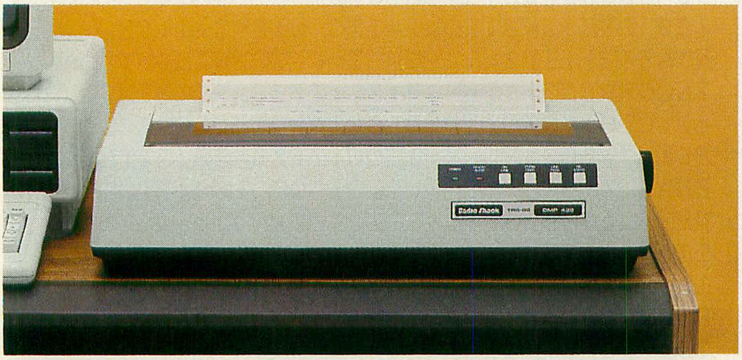

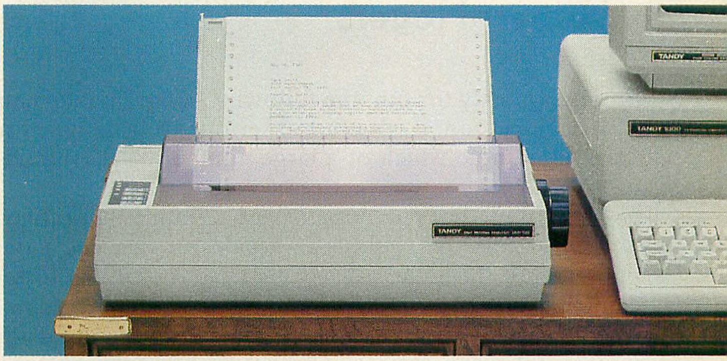

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```
ENI(W+1)=0
80 A$=INKEY$:IFA$<>""THEN90 ELSE
60
90 Q=Q+1:X=(2*I(W)):Y=(2*(W+1)):
IFPOINT(X,Y)=-1 THEN 120 ELSE IF
 X<=0 THEN 60 ELSE IF POINT(X-1,
Y)=-1 THEN 120
100 IF X>=62 THEN 60 ELSE IF POI
NT(X+2,Y)=-1 THEN 120
110 GOTO 60
120 V=V+32:IFV>224 THEN V=0:U=U+
1:IFU>5 THEN 120
130 POKE 15877,U:POKE15878,V
140 O=W*32+I(W):PRINT@O," ";:W=W
+1:O=W*32+I(W):PRINT@O,".";:IFW=
14 THEN 150 ELSE 60
150 I(W)=I(W)-1:IFI(W)<0 THEN 16
0 ELSE A=USR0(0):GOTO150
160 SC=SC-TIMER:SC=SC-(8*Q):IFSC
>TS THENTS=SC
170 PRINT@483,"SCORE = ";SC;" TO
P = ";TS;:A$=INKEY$:IFA$=""THEN1
80 ELSE40
180 A$=INKEY$:IFA$=""THEN180 ELS
E 40
```

16K
ECB

Decisions, Decisions

By Robert Rogers

Although mostly for fun, the following program may help you make a decision, if it's not too serious. It is designed to help you determine which of a large number of alternatives is most desirable.

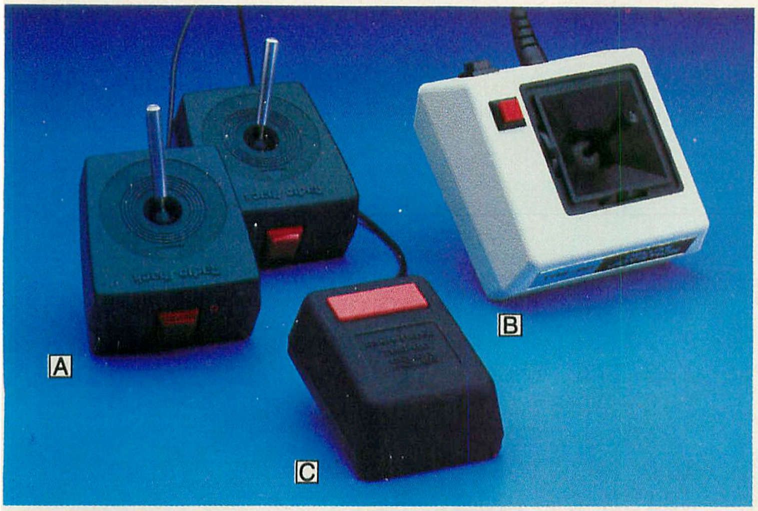
Upon running, the program asks you to input alternatives. Let's say, for example, you can't decide which video game to buy and you have narrowed your selections down to the following: *The King, Astro Blast, Berserk, Colorpede, Lunar Rover Patrol, Ghost Gobbler* and *Sea Dragon.* Input the selections and when the last alternative has been entered, press ENTER.

At this point, you are given the opportunity to make changes and/or add any new items; then the decision-making process begins. All items are compared to the others without repetition. Simply press 1 or 2, depending on which item you prefer. When all the alternatives are matched and you have made your decisions, the results are displayed. The alternatives are listed from the choices you made, ranked in order of the number of times you selected them. Ties are identified and ranked the same.

The listing: DECISION

```
 1 '*****************************
 2 '*      MICRO-DECISION       *
 3 '*  COPYRIGHT  (C) 1984 BY   *
 4 '* ROBERT ROGERS & RTR*SOFT  *
 5 '*  VERSION 1.0  JUNE 1984   *
 6 '* FOR 4K COLOR BASIC COCOS  *
 7 '*****************************
 10 CLEAR10000:CLS
 30 DIMA$(21),B(21),P(21),P$(21),
 T(21)
 50 CLS:PRINTTAB(9)"MICRO DECISIO
N":PRINT"ENTER THE ALTERNATIVES
THAT ARE UNDER CONSIDERATION. <E
NTER>    WILL TERMINATE ENTRY OF
 ITEMS.":PRINTSTRING$(32,143+32)
;:SOUND200,1
60 C=0
70 C=C+1
80 PRINT"ALTERNATIVE"C;:INPUTA$(
C):IFA$(C)=""THENC=C-1:GOTO100
90 SOUND225,1:GOTO70
100 CLS:Z=0:FORT=1TO C:Z=Z+1:PRI
NTA$(T):IFZ>12 OR T=C THENINPUT"
INCORRECT ITEM ";Z$:IFZ$=""THENZ
=0:CLS:GOTO110:ELSEINPUT"CORRECT
ED: ";ZZ$:FORY=1TOC:IFZ$=A$(Y)TH
ENA$(Y)=ZZ$:Z=0:CLS:GOTO100:ELSE
NEXTY:SOUND1,3:GOTO100
110 NEXTT
130 CLS:PRINT"      TESTING OF PR
EFERENCES
150 FORI=2TOC
160 FORJ=1TOI-1
180 PRINT"WHICH ALTERNATIVE DO Y
OU PREFER:"
190 PRINTSTRING$(32,CHR$(143+96)
)
200 PRINT@192,"<1> "A$(I)
210 PRINTTAB(5)"OR"
220 PRINT"<2> "A$(J)
230 PRINT:INPUT"TYPE CHOICE:";W:
IFW<>1ANDW<>2THENCLS:GOTO180:ELS
ESOUND200,1:CLS
240 IFW=1THENT(I)=T(I)+1
250 IFW=2THENT(J)=T(J)+1
260 NEXTJ,I
280 FORN=1TOC:T(N)=T(N)+1:NEXTN
290 FORF=1TOC
300 L=0:V=0
310 FORN=1TOC
320 IFT(N)>V THEN L=N:V=T(N)
330 NEXTN
340 P(F)=L:H(P(F))=T(L)
350 T(L)=0
360 NEXTF
370 CLS:PRINT"HERE ARE THE ALTRN
ATIVES RANKED ON THE BASIS OF YO
```

Radio Shack has the...



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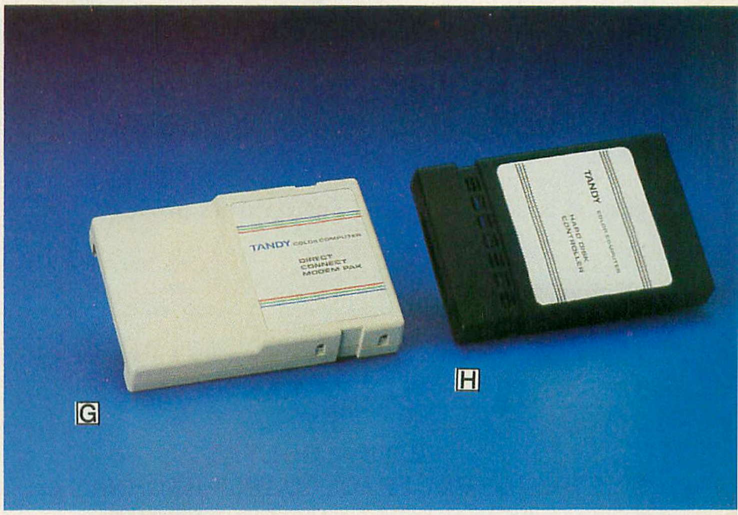
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```
UR CHOICES..."
380 PRINTSTRING$(32,143+112);
390 PRINT"RANK    ALTERNATIVE
400 F=0:R=0:FORN=1TOC:F=F+1
410 IFF=12 AND C>12 THENPRINT"<E
NTER> TO CONTINUE":EXEC44539:F=0
420 IFH(P(N))=H(P(N-1))THENPRINT
R;"TIE";:ELSER=R+1:PRINTR;
425 PRINTTAB(9);A$(P(N))
430 NEXTN
440 PRINT"<ENTER> WHEN READY":EX
EC44539
450 RUN
```

Safety

16K
ECB

A Public Service Message

By Ruth Golias

The following program could be a real lifesaver if the suggestion is taken seriously. The statistics prove it!

The listing: MESSAGE

```
1 '******************************
2 '        SILENT RADIO
3 '            BY
4 '        RUTH  GOLIAS
5 ' 2826 PACIFIC COAST HIGHWAY
6 '   TORRANCE, CALIF. 90505
7 '           1986
8 '******************************
9 '
10 CLS0:PRINT@170,"silent";:PRIN
T@176,CHR$(128);:PRINT@177,"radi
o";
20 PRINT@239,"by";
30 PRINT@298,"ruth";:PRINT@302,C
HR$(128);:PRINT@302,CHR$(128);:P
RINT@304,"golias";
40 FOR B=0 TO 31:PRINT@B,CHR$(11
1);:NEXT B
50 FOR B=31 TO 479 STEP32:PRINT@
B,CHR$(111);:NEXT B
60 FOR B=0 TO 448 STEP32:PRINT@B
,CHR$(111);:NEXT B
70 FOR B=1504 TO 1535:POKE B,15:
NEXT B:SCREEN0,1
80 FOR D=1 TO 3000:NEXT D
90 CLS0
100 FOR B=163 TO 190 STEP 2:PRIN
T@B,CHR$(180);:NEXT B  'TOP OF R
ADIO-RED
110 FOR B=227 TO 253 STEP 2:PRIN
T@B,CHR$(177);:NEXT B 'BOTTOM OF
 RADIO-RED
120 PRINT@195,CHR$(181);    'LEFT
 SIDE OF RADIO-RED
130 PRINT@221,CHR$(181);    'RIGH
T SIDE OF RADIO-RED
140 FOR B=291 TO 317:PRINT@B,CHR
$(220);:NEXT B  'TOP COUNTER ROW
-BLUE
150 FOR B=322 TO 350:PRINT@B,CHR
$(220);:NEXT B  'MIDDLE COUNTER
ROW-BLUE
160 FOR B=353 TO 383:PRINT@B,CHR
$(220);:NEXT B  'BOTTOM COUNTER
ROW-BLUE
170 FOR B=385 TO 479 STEP 8:PRIN
T@B,CHR$(218);:NEXT B  'COUNTER
POSTS-BLUE
180 FOR B=415 TO 479 STEP 32:PRI
NT@B,CHR$(213);:NEXT B   'RIGHT
COUNTER POST-BLUE
190 FOR B=1505 TO 1535 STEP2:POK
E B,169:NEXT B   'FLOOR-BLUE
200 FOR B=1506 TO 1534 STEP2:POK
E B,185:NEXT B   'FLOOR-RED
210 PRINT@106,CHR$(191);:PRINT@1
07,"silent";:PRINT@113,CHR$(191)
;:PRINT@114,CHR$(191);:PRINT@114
,"radio";:PRINT@119,CHR$(191);:S
CREEN0,1
211 ' WALKING LETTERS
220 A$=" FASTEN YOUR SEAT BELT
        IT'S THE LAW     "
230 S=300
240 FOR B=196 TO 220
250 FOR X=1 TO S:NEXT X
260 B=B+1
270 IF B=220 THEN 240
280 PRINT@B,LEFT$(A$,221-B);
290 PRINT@197,RIGHT$(A$,B-197);
300 SCREEN0,1
310 GOTO250
```

Utilities

4K

Cassette Organization

By J. E. Rittenhouse

Tape Menu is a simple utility for cassette organization. It allows you to list all the programs filed on a cassette, assign each a program number and automatically CLOAD a specific program by simply pressing a key.

To set up *Tape Menu*, enter the program names in the DATA statements in lines 40, 50 and 60. This can be done by retyping the lines and replacing PROGRAM NAME with the actual name of the program. Be sure to separate multiple listings in each line with commas. If you need more room on the screen to display your listings together, delete Line 250 (type DEL 250).

The program is designed for six program listings. However, you can change the amount by editing lines 7 and 10 to fit your needs:

7 DIM P$ (*insert number of programs*)

10 FOR X=1 TO *insert number of programs*

To do this, type EDIT 7 and press ENTER. The original program line will appear. Press the space bar eight times (to reach the point you want to change) and the following will be displayed:

```
7 DIM P$ (
```

Type D (represents delete a character) and then type I (represents insert a character), followed by the number of programs you want to use in the menu and press ENTER. For example, if you want to change the number of programs to eight, Line 7 will then look like this:

```
7 DIM P$ (8)
```

You can also change a line by retyping the entire line. Line 10 should be changed in the same manner as Line 7. Refer to your user's manual for more information on editing functions.

CSAVE"TAPEMENU" at the start of each cassette you want to organize. Then CSAVE each of the programs in numerical order as they are listed in lines 40, 50 and 60. Note: Instead of assigning each program a code name, use the listing number. For example, use CSAVE"1", CSAVE"2", CSAVE"3", etc. Again, you can add new programs to the list by changing lines 7 and 10, and add new DATA statements for the additional programs. When saving *Tape Menu*, be sure to leave a short blank space following it on the tape in case you need the space to add additional DATA statements later.

Using *Tape Menu* may seem a bit bothersome to set up initially, but once you have organized all of your tapes in this manner, all you will need to do is load and run *Tape Menu*, and input a selection; the program will automatically be loaded.

The listing: TAPEMENU

```
1 REM*TAPE MENU
3 REM BY J.E.RITTENHOUSE
5 CLS
7 DIM P$(6)
10 FOR X=1 TO 6
15 READ P$
17 IF EOF(P) THEN 250
20 PRINT X;"-";P$
30 NEXT X
40 DATA PROGRAM NAME,PROGRAM NAM
E
50 DATA PROGRAM NAME,PROGRAM NAM
E
60 DATA PROGRAM NAME,PROGRAM NAM
E
250 PRINT:PRINT:PRINT
260 PRINT"ENTER THE NUMBER OF TH
E"
270 INPUT"PROGRAM YOU WISH TO US
E";A$
280 CLOAD A$
```

16K

Sound Off

By Dave Lengel

The following utility uses the CoCo's single-bit sound capability to create a click sound when any key is pressed on the keyboard.

Upon running *Key Beep*, you are asked to input an address where the machine language is to reside. (Use &H0FFF as an example.) The ML portion of the program is then poked into memory and executed.

The listing: KEY BEEP

```
10 INPUT"INPUT START ADDRESS";S
20 FORI=S TOS+76
30 READA:POKEI,A
40 NEXT
50 EXECS
100 DATA 182,255,35,132,243,183,
255,35,182,255,34
110 DATA 138,2,183,255,34,182,25
5,35,138,4,183
120 DATA 255,35,190,1,107,175,14
1,0,38,49,141
130 DATA 0,4,16,191,1,107,52,6,1
98,10,134
```

```
140 DATA 2,186,255,34,183,255,34
,141,18,134,253
150 DATA 180,255,34,183,255,34,1
41,8,90,38,233
160 DATA 53,6,126,0,0,134,100,74
,38,253,57
```

16K

Echo

By John Stewart

Echo allows you to get a hard copy of your session on the CoCo. The program gets its name from its ability to echo any character printed on the screen to your printer. To do this the program intercepts your CoCo's output routine using a RAM hook at Memory Location 360. It checks to see if a character is being sent to the screen and then sends the character to the printer and then back to the screen.

If you have Extended Color BASIC, after running, you can start *Echo* working by typing `A=USR0(0)` and pressing ENTER. The printer will start printing everything that is on the screen. To stop the echo function, type `A=USR1(0)` and press ENTER.

If you do not have Extended Color BASIC, you must use the `EXEC` command to get *Echo* to work. First, delete lines 80 and 90. Then, to start *Echo*, type `EXEC 512` and press ENTER. To stop *Echo*, type `EXEC 537` and press ENTER.

Note: Be sure your printer is turned on and the baud rate (600 baud: `POKE150,87`; 1200 baud: `150,41`; 2400 baud: `POKE 150,18`; 4800 baud: `POKE 150,7`; 9600 baud: `POKE150,1`) is set before you run *Echo* or your computer will lock up.

The listing: `ECHO`

```
5 '          ECHO
10 ' SENDS SCREEN OUTPUT
20 ' TO PRINTER
30 ' BY JOHN STEWART,  MAY 1986
40 FORX=&H200 TO &H241
50 READ A$
60 POKE X,VAL("&H"+A$)
70 NEXT X
80 DEFUSR0=&H200
90 DEFUSR1=&H219
100 CLS:PRINT"TO SEND OUTPUT TO
PRINTER TYPE  A=USR0(0) AND PRES
S ENTER":PRINT:PRINT"TO STOP OUT
PUT TO PRINTER TYPE  A=USR1(0) A
ND PRESS ENTER"
110 DATA A6,8D,0,3D,26,12,6C,8D,
0,37,BE,1,68,AF,8D,0,2E,30,8D,0,
10,BF,1,68,39,AE,8D,0,22,BF,1,68
,6F,8D,0,1D,39,34,2,96,6F,26,E,8
6,FE,97,6F,35,2,34,2,AD,9F,A0,2,
F,6F,35,2,6E,9D,0,0,0,0,0
```

16K
Disk

Joystick Directory

By Dale Atwater

Joystick Directory will organize your disk directory in two columns, keep your directory from scrolling off the screen, and automatically load and execute any program selected using the right joystick.

Upon loading the program, enter a selected disk in the drive and choose either to display another directory or execute a program.

The listing: `DIRECTRY`

```
10 CLEAR 1000
20 DIMI$(58),F$(2)
30 N=0
50 FOR I=1 TO 9
60 DSKI$0,17,2+I,F$(1),F$(2)
70 FOR F=1 TO 2
80 FOR J=1 TO 97 STEP 32
90 IF MID$(F$(F),J,1)=CHR$(255)
THEN GOTO170 ELSE IF MID$(F$(F)
J,1)=CHR$(32) THEN GOTO 140
100 Q$=MID$(F$(F),J+8,3)
110 C$=MID$(F$(F),J,8)+"/"+Q$
120 N=N+1
130 I$(N)=C$
140 NEXT J
150 NEXT F
160 NEXT I
170 CLS:PA=0
175 I$(24)=""
180 FOR I=1 TO N
190 IF I>30 AND PA=0 THEN PRINT@
480,"press m for more, c to choo
se";:GOSUB250:PA=-480:CLS
200 PRINT@PA+2+(I-1)*16,I$(I);
210 NEXT I
220 PRINT@480,"enter to repeat -
 c to choose";
230 GOSUB250
240 RUN
250 I$=INKEY$:IF I$="" THEN 250
ELSE IF I$="M" OR I$=CHR$(13) TH
EN RETURN ELSE IF I$<>"C" THEN 2
50
260 J=JOYSTK(0):JJ=JOYSTK(1)
270 IF J=0 THEN T=0 ELSE IF J=63
 THEN T=16
280 PRINT@PO," ";:A=INT(JJ/4.3)*
32:PO=A+T:PRINT@PO,CHR$(127+RND(
8)*16);
290 IF PEEK(65280)=126 OR PEEK(6
5280)=254 THEN FOR X=1024+PO+2 T
```

```
O 1024+PO+14:A$=A$+CHR$(PEEK(X))
:NEXT X:GOSUB310:GOSUB 335
300 GOTO 260
310 FOR X=1 TO LEN(A$)
320 IF MID$(A$,X,1)=CHR$(96) THE
N MID$(A$,X,1)=" "
330 NEXT X:RETURN
335 FOR X=1 TO LEN(A$):IF MID$(A
$,X,1)="o" THEN MID$(A$,X,1)="/"
:NEXT X ELSE NEXT X
340 IFRIGHT$(A$,4)="BIN "THENCLS
:PRINT"-->"A$:LINEINPUT"ARE ANY
COMMANDS REQUIRED PRIOR TO LOADI
NG ?";B$:IFB$="Y"OR B$="YES" THE
NLINE INPUT"HAVE YOU DONE THESE
COMMANDS    (Y/N)";B$:IF B$="YES
" OR B$="Y" THEN LOADM A$:EXEC E
LSE 370 ELSE 380
350 IF RIGHT$(A$,4)="BAS " THEN
LOAD LEFT$(A$,8),R
360 CLS:PRINTA$:PRINT"I DO NOT K
NOW THIS EXTENSION     ("RIGHT$(A
$,3)")","SHOULD I LOADm OR lOAD"
;:GOTO400
370 PRINT"PLEASE DO THESE COMMAN
DS THEN   TYPE 'CONT'":STOP:LOAD
M A$
380 CLS:PRINT@224+16-(LEN("LOADI
NG "+A$)/2),"LOADING "+A$
390 LOADM LEFT$(A$,8):EXEC
400 I$=INKEY$:IF I$="" THEN 400
410 IF I$="M" THEN LOADM LEFT$(A
$,8):EXEC
420 IF I$="L" THEN LOAD LEFT$(A$
,8),R
430 GOTO 400
```

16K
ECB

Planning Ahead

By Bill Bernico

Everyone is saving for one thing or another. Maybe it's an official Donny and Marie pup tent or perhaps a Davey Crockett coonskin cap. Or maybe it's something practical, like the new CoCo 3. In any case, you'll want to know how long you have to save before you can actually buy. *Savinfor* will tell you exactly that, down to the week, or any part thereof.

Simply follow the prompts. When inputting money amounts, don't use the dollar sign ($). If you are entering amounts under a dollar, like 37 cents for example, input `.37`. After you input the amount earned from your allowance and/or job, you are asked how much you want to keep each week for spending. Obviously, the amount you want to keep can't be larger than the amount you earn. If you try to do this, a message will appear telling you just that — which proves you can't spend more than you have . . . unless, of course, you have a charge card.

The listing: SAVINFOR

```
0 'SAVINFOR by BILL BERNICO
1 CLS3:PRINT"WHAT IS YOUR NAME";
:PRINT@32,"";:INPUTN$:CLS:PRINT"
WELL, "N$:PRINT"WHAT ITEM ARE YO
U SAVING FOR?":FORX=1029TO(1030+
LEN(N$)):POKEX,PEEK(X)-64:NEXTX:
LINEINPUTA$:PRINTSTRING$(32,175)
;:PRINT"WHAT DOES ";A$:INPUT"COS
T IN DOLLARS";B
2 PRINTSTRING$(32,191);:PRINT@26
1,"IS YOUR INCOME FROM:":PRINT:F
ORX=1285TO1304:POKEX,PEEK(X)-64:
NEXTX:PRINT"     1.) ALLOWANCE":
PRINT"     2.) JOB":PRINT"     3
.) BOTH":PRINT:PRINT"     ENTER
(1-3)";:INPUTC:ON C GOSUB6,7,8
3 CLS:PRINT:PRINT"   YOUR TOTAL
WEEKLY INCOME IS":F=D+E:PRINT:PR
INT:PRINT"              ";:PRINTU
SING"$###.##";F:PRINT:PRINT:PRIN
T" HOW MUCH OF THAT DO YOU WANT
   TO KEEP EACH WEEK FOR SPENDIN
G":PRINT:PRINT:PRINT"         ";:INP
UTG
4 IF G>F THENPRINT@354,"YOU CAN'
T KEEP MORE THAN YOU    MADE.  T
RY AGAIN":FORX=1TO1500:NEXTX:GOT
O3ELSE H=F-G:CLS:PRINTSTRING$(64
,128);:PRINT"THIS LEAVES ";N$:W=
B/H:PRINTUSING"$###.##";H;:PRINT
" PER WEEK":PRINTSTRING$(96,128)
;
5 PRINT"AT THIS RATE YOU WILL HA
VE       ENOUGH MONEY TO BUY
       ";A$:PRINT"IN";:PRINTUSI
NG"###.#";W;:PRINT"  WEEKS TIME"
:PRINTSTRING$(128,128);:GOTO9
6 CLS:PRINT:PRINT"HOW MUCH DOES
";N$:PRINT"GET FOR A WEEKLY ALLO
WANCE":PRINT:PRINT"      examples
:":PRINT"      75 CENTS =  .75":P
RINT"     1 DOLLAR = 1.00":PRINT
"     $3.50     = 3.50":PRINT:PRI
NT:PRINT;:INPUTD:RETURN
7 CLS:PRINT:PRINT"     HOW MUCH D
O YOU MAKE ON       YOUR JOB P
ER WEEK":PRINT:PRINT:PRINT"      $
";:INPUTE:RETURN
8 GOSUB6:GOSUB7:GOTO3
9 PRINT@484,"aNOTHER RUN   eND";
:EXEC43345:FORX=1TO100:NEXTX:IN$
=INKEY$:PRINT@484,"ANOTHER RUN
 END";:EXEC43345:FORX=1TO100:NEX
TX:IFIN$=""THEN9ELSEIFIN$="A"THE
NRUNELSEIFIN$="E"THENCLS:ENDELSE
9
```

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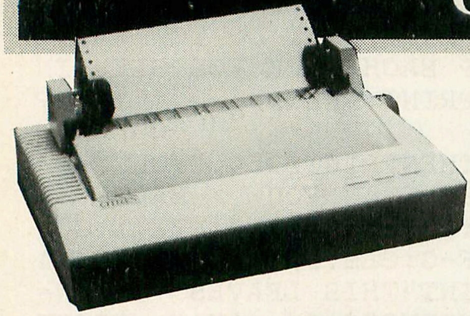

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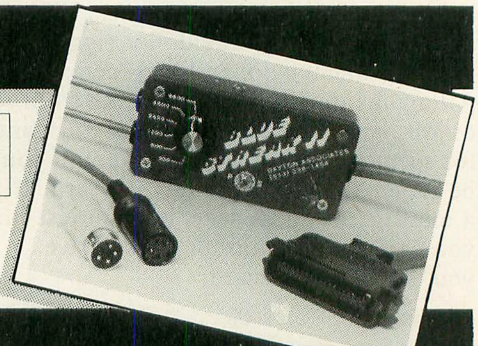

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RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer. Nowhere else will you see as many CoCo-related products or be able to attend free seminars conducted by the top Color Computer experts. It's like receiving the latest issue of THE RAINBOW in your mailbox!

RAINBOWfest is a **great opportunity** for commercial programmers **to show off new and innovative products for the first time. Chicago is the show** to get information on capabilities for the new CoCo 3. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

To make it easier for you to participate, we schedule RAINBOWfests in different parts of the country. If you missed the fun in Princeton, why don't you make plans now to join us in Chicago? For members of the family who don't share your affinity for CoCo, RAINBOWfest is located in an area with many other attractions.

As a new feature for RAINBOWfest, we are planning an **Educational Sandbox**. This will feature **child-oriented workshops** to give hands-on experience to an age group often neglected. There will be a session for the kindergarten to third grade set and another for fourth through seventh graders. RAINBOWfest has something for everyone in the family.

The Hyatt Regency Woodfield offers special rates for RAINBOWfest. **The show opens Friday evening** with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get your special room rate.

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW affiliate, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

CoCo Community Breakfast

Greg Zumwalt — CoCo 3 Programmer

Our keynote speaker for the traditional CoCo Community Breakfast is Greg Zumwalt, one of the early CoCo specialists. An independent programmer and computer designer, Greg is one of the select few writing Tandy software for the new Color Computer 3. He owns ZCT Software, of Tulsa, Okla., and also writes software for various business applications.

RECEIVED & CERTIFIED

The following products have recently been received by THE RAINBOW, *examined by our magazine staff and approved for the* Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

This month the Seal of Certification *has been issued to:*

The Amazin' Maze Game, contains 60 data files from which you can choose different mazes. All places in each maze are accessible so that the player can move about and pick up points. The object is to escape from the maze. This game requires 64K ECB and one disk drive. *Mikaron Software Company, P.O. Box 1064, Chester, CA 96020; $9.95 plus $.50 S/H.*

Art Gallery, a 32K Extended BASIC graphics display program. Show off your CoCo art collection with machine language special effects. Program includes nine sample pictures, as well as instructions for viewing your own creations. *Tothian Software, Box 663, Rimersburg, PA 16248; $19.95.*

Bouncing Boulders, a 64K game. The object is to move around the screen collecting the required number of gems to activate the Exit square. Joystick is optional. *Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8; (416) 878-8353, $28.95; $38.95 Cnd.*

Color Scribe II, a 128K CoCo 3 word processing program. This program allows a choice of 40-, 64- or 80-column display in either amber, green, blue or monochrome. Buffer gives over 64K bytes, and a command is provided to tell how many bytes are available. Text formatting capabilities include justification, headers, footers, pagination and more. Macro commands are supported to save time and keystrokes. *Computerware, Box 668, 4403 Manchester Avenue #102, Encinitas, CA 92024; (619) 436-3512, $49.95.*

Color Connection IV, a 128K CoCo 3 telecommunication package. Use baud rates up to 1200 baud directly from the back of the computer, or up to 9600 with the use of a Multi-pak. Features 40-, 64- or 80-column text display in amber, green, blue or monochrome modes. This program also supports the auto-answer/auto-dial features for Hayes compatible and some Radio Shack printers. *Computerware, Box 668, 4403 Manchester Avenue #102, Encinitas, CA 92024; (619) 436-3512, $49.95.*

CMOS Hitachi 63B09E and 63B21, replacement chips for the Color Computer CPU and PIA. *CMOS Conversions, 480 Oakdale Road NE, Suite 3, Atlanta, GA 30307; (404) 681-0581, CPU $49.50; PIA $19.50.*

Super Programming Aid Version III, a CoCo 3 utility program to integrate most used functions and save disk space. The Version III print spooler has been updated to use the memory mapping unit available in the CoCo 3 and to use 12K of the memory which is not used by BASIC as a print spool area. A new screen print command has been added to allow you to print the contents of the 40- and 80-character screen to the printer. *Bangert Software Systems, P.O. Box 21056, Indianapolis, IN 46221; (317) 262-8865, $29.95.*

The Word Search Game, a 64K ECB game requiring one disk drive. The disk contains 51 data files from which you can choose a list of words. All of the words are then placed in a randomly designed puzzle for you to find. This game can be used as an educational tool for children in the fourth grade and up. *Mikaron Software Company, P.O. Box 1064, Chester, CA 96020; $16.95 plus $.50 S/H.*

Wrestle Maniac, a 64K game requiring one joystick. Pin your opponent for the 3 count and win the match. You control your wrestler and can move anywhere within the ring. Wrestling moves and actions are controlled by the joystick, and up to four players may participate in the same match. *Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8; (416) 878-8358, $28.95; $38.95 Cnd.*

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Judi Hutchinson

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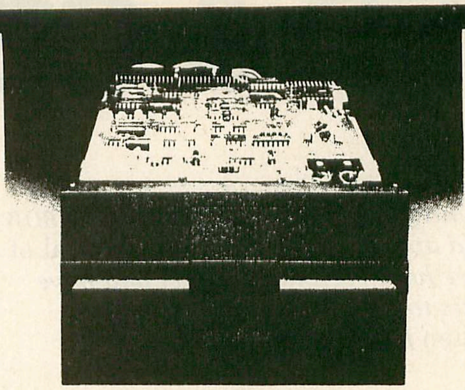

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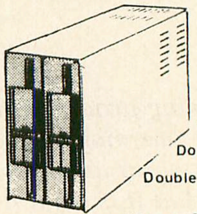

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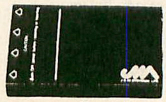

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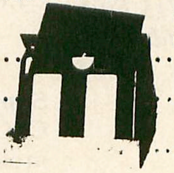

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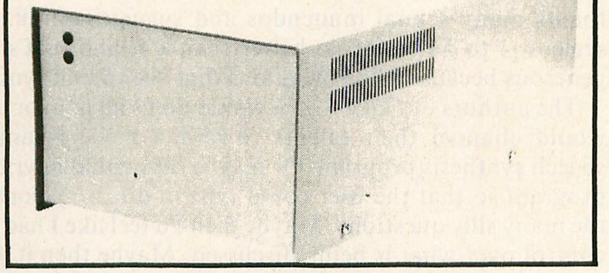

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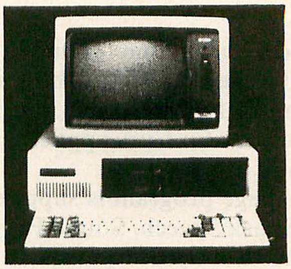

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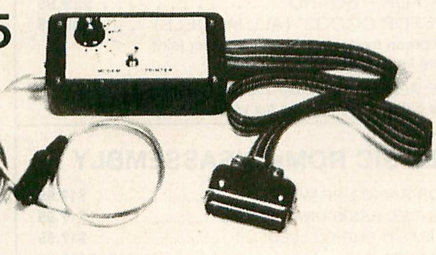

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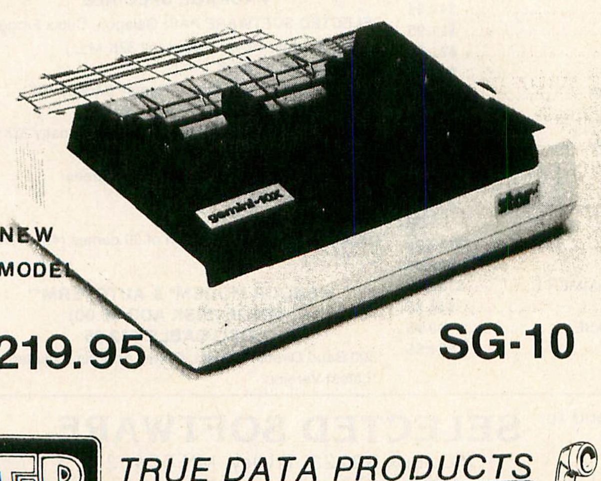

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The *CoCo Guru* Has a Mind of Its Own

My *Webster's Dictionary* defines a Guru as one's personal spiritual adviser or teacher. It also says he is a leader, highly regarded by a group of followers and that sometimes the term is used derisively. *CoCo Guru* applies only to the latter part of that definition.

The machine language program is supplied on disk and requires the Radio Shack Speech/Sound Pak. No documentation is provided nor is it needed to run the program. The disk is copy-protected, and works on the CoCo 3.

Most of us think of a Guru as a wise man; a philospher with deep religious roots. This Guru however, is nothing more than a dirty old man who rambles endlessly about nothing in general and sex in particular. If bad taste is your bag, read on.

The only input you, the user, have is typing in your name. From then on the Guru asks and answers all the questions that are directed to you.

Often when a question is asked, you might want to answer differently than the program allows, and that is a big flaw in the program. You find yourself only an observer to a conversation that leaves you speechless. The questions and answers are totally irrelevant to anything and are sometimes humorous. The program is structured to create random sentences, which I suppose is why the thing is so darned nutty. I found myself unwillingly glued to my CoCo in utter disbelief at how really awful it was. It's like watching a Pee Wee Herman movie; you just can't figure out how he can make money being so downright corny. Maybe that's what the authors of *CoCo Guru* had in mind when they released it for sale. They may sell a few, but it will never be a hot item for the CoCo as far as I am concerned. It's definitely not for youngsters, either; in fact, it deserves an 'R' rating for its many sexual innuendos and suggestive talk. On a scale of 1 to 5 it rates no better than a 1, and that's being generous because I like programs that use speech synthesis.

The authors of *CoCo Guru* would do us all a favor if they would channel their talents toward a more meaningful speech synthesis program. Or maybe they could rewrite this program so that the user could type in direct responses to the many silly questions. Maybe then I'd feel like I had some control over what is being discussed. Maybe then it would rate a 2.

(Thinking Software, 46-16 65th Place, Woodside, NY 11377; 718-429-4922, $34.95)

— Jerry Semones

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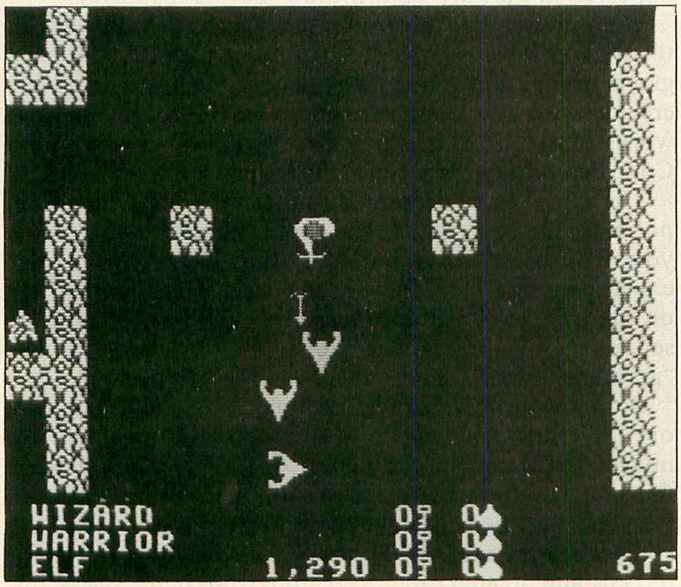
Discover the Magical Maze of *Gantelet*

Shades of Dungeons and Dragons. *Gantelet*, by Diecom Products, is one of those maze-type games filled with creatures, treasures, door keys and magic objects, including the famous magic potion. The game requires a 64K CoCo and is available on tape or disk. It can be played with one to three players. Joysticks are required to play with more than one player. One player uses the arrow keys to move around the maze and the space bar to fire in the direction you are facing. The other two players use the joysticks and fire buttons.

The game consists of a multiple-level maze. The exact number of levels is unknown. The object is to find treasures and advance from level to level, scoring as many points as possible before your character dies. No mention is ever made of escaping the maze. Each player begins with 600 "health" points. You may increase health points by finding food scattered around the various levels of the maze, otherwise they decrease as time goes on. When the health points reach zero, the player is dead. The game is over when all players have died.



Creatures move around the levels searching for players to attack. An attack by a creature reduces a player's health points. A special creature, Death, can drain your health very quickly. You must avoid him at all costs. Creatures may be shot, or all creatures and creature generators on the screen may be destroyed by using a magic potion if you happen to have found one. Other objects have magical qualities for the players to discover.

If you find a key you may walk over it to pick it up. It may then be used to open a door which consists of a series of blue squares. I never have much luck with artifact colors so my doors were always green. Entering an "exit" square moves a player to the next level, while entering a "teleporter" moves the player to another place on the screen on the same level. If more than one player participates, all players must be in the exit before anyone is placed on the next level.

The game is well-done and provides quite a challenge, especially on the higher levels where more creatures exist. The characters respond a little sluggishly to the joysticks and may take some getting used to, but this was not a serious drawback. All players must remain visible on the screen at all times. This means two players cannot go in opposite directions in the maze because the screen cannot scroll two directions at the same time. The screen appears to lock up until both players proceed in the same direction. This also takes some getting used to, as well as player cooperation.

For a gamester, *Gantelet* provides a thrill and a challenge. It would make a good addition to anyone's maze collection.

(Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8; 416-878-8358, $28.95; $38.95 Cnd.)

— Larry Birkenfeld

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- **POWERFUL** - User has the option of normal or "Megados" operation Megados provides an initial 254 granules of storage on a specially formatted diskette (included with the program) and 6 millisecond operational speed This program is designed to recognize disk storage space as memory - It will write and read files up to 252 granules (580K) long
- **SIMPLICITY** - All postings are initially made to the general journal Postings to all other journals and ledgers, including preparation of a trial balance and the statement of income and expense is a fully automatic, menu-controlled function.
- **PRINTER FUNCTION** - The user can obtain a hardcopy of any work produced by the program. Changes of baud rate (300-9600) are accomplished with a single keystroke.
- **DOCUMENTATION** - Complete and comprehensive documentation covering every aspect of operation is supplied in simple, non-technical terms Actual "keyable" examples are given throughout.

The CoCo Bookkeeper operates according to generally accepted accounting procedures. It will take a business from opening day to the final balance sheet and profit and loss statement at income tax time, then open the books for the following year.

32K and one disk drive required. Supports multi-drive systems

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By Art Martin

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Iron-On Transfers With UNDERWARE Ribbons and Color Pens

Diversions, Inc., is marketing a line of products cleverly entitled UNDERWARE. At the heart of this product line is the UNDERWARE printer ribbon. Anything printed on plain paper with this ribbon becomes an iron-on transfer ready to adorn your favorite article of clothing. UNDERWARE ribbons are available in black for the following printers: Imagewriter I & II, Oki/Gemini Spool, Epson FX-70/80/100, Epson LQ-1500, Star Radix 10, IBM ProPrinter, Toshiba P-1350, TI 850 & 855, and Mannesmann Tally MT-80. Prices for these ribbons range from $14.95 to $21.95.

Ribbons are available in red, blue, green, yellow, brown and purple for the Imagewriter I & II, Oki/Gemini Spool, and Epson FX-70/80 for $16.95.

Multi-color ribbons are available for Imagewriter II ($29.95) and Epson JX-80 ($34.95) color printers.

If your printer is not on the list, don't despair; Diversions has specially formulated carbon paper that works to create transfers with any impact printer that accepts sheet fed paper.

The use of a graphics software package enhances this product. Remember, though, the image printed on paper must be the mirror image of the desired finished product. The UNDERWARE documentation indicates that many graphics packages include such a "flip" feature. If yours does not, Robert C. Montowski's *FLIP-L2R* utility which appeared in the July '86 RAINBOW may be the ticket.

You may want to spruce up the designs you create with UNDERWARE ColorPens. A set of these includes red, blue, green, orange and yellow. Whether used to decorate images created with UNDERWARE ribbons or to create free-hand works of art, anything drawn or written on paper with a ColorPen becomes an iron-on transfer.

The fabric to be decorated should be at least 50 percent polyester for best results. The documentation suggests that your iron be set to its hottest setting. Be careful here — experiment on an old shirt or something. The hottest setting on my iron scorched and nearly melted the fabric within seconds and created very unsatisfactory results. The "permanent press" setting turned out right for me.

Both the printed images and those created with ColorPens transferred well. My advice regarding printed images is the bolder the better. ColorPen creations look much better after transferred to cloth than they do on paper. Pen lines in filled in areas seem to disappear to uniform color when transferred. My daughter Emily was in charge of pens and created quite a creature from outer space!

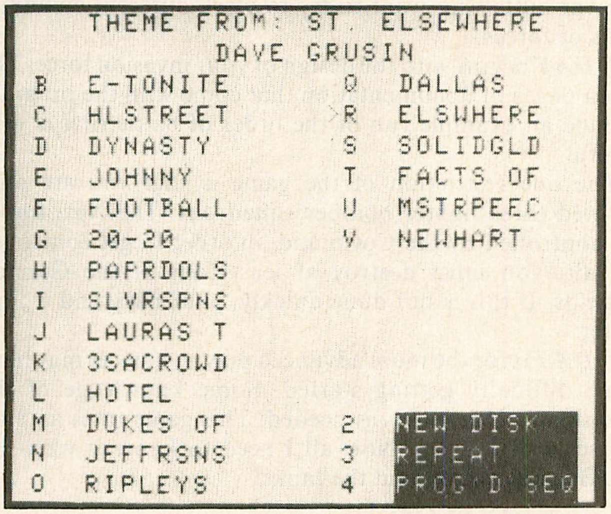
I have a couple of questions for Diversions, Inc. Why no ribbons for Radio Shack printers? Why no mention in the documentation of Tandy computers and graphics software for them?

(Diversions, Inc., 505 W. Olive Ave. #520, Sunnyvale, CA 94086; 408-245-7575, ribbons from $14.94 to $21.95; pens, $14.95)

— Stanley Townsend

Music Libraries for Your Listening Pleasure

Speech Systems is well-known in the CoCo Community for its popular music programs, voice synthesizers and E.A.R.S. To complement these fine pieces of software, what else would a company sell? Why not sell examples of the output of these programs. Hence, *Music Libraries 400, 500, 600, 700* and *800*. These packages are in addition to the *Music Libraries 100, 200* and *300*.



```
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J  LAURAS T
K  3SACROWD
L  HOTEL
M  DUKES OF          2  NEW DISK
N  JEFFRSNS          3  REPEAT
O  RIPLEYS           4  PROG'D SEQ
```

Each Music Library contains five or six disks with over 100 four-voice music selections. The entire library is the work of two music lovers. Volumes 100 to 400 and 600 were transcribed and arranged by C. Clark Rulaford, and volumes 500, 700 and 800 were compiled by Speech Systems vice-president, Randy Spector. As a serious user of *Musica, Musica II* and *Lyra*, I am well aware of the time and work involved in compiling such libraries. A tip of the hat to both these gentlemen for their fine job.

While each volume is available on both tape and disk, I received the disk version. You are instructed to run a program called JUKEBOXD. After doing so, you are greeted with a two-column menu of all the selections available on the disk. From there, you may choose to listen to a single selection or all selections on the disk. (*Musica* is not required for listening to the music in the music libraries.)

In addition, the JUKEBOXD program supports output to the Speech Systems Stereo Pak as well as to the TV. It also supports high-speed playing. The Stereo Pak output works very well and, at high speed, you can sit back and imagine you are sitting in a concert hall.

An obvious attempt has been made by Speech Systems to ensure a variety of music styles in each volume. For example, Volume 700 contains TV Themes, Beethoven, Broadway, Blues, Kenny Rogers, The Beatles and Country Classics Parts 1 and 2. With such a wide variety of music, it is somewhat difficult to pick your favorites. Personally, I never liked the "Moonlight Sonata" by Beethoven until I heard some of the special effects introduced by the arranger. I have listened to these five libraries in their entirety four different times. There are very few mistakes in transcription. I am even considering running an output from my computer room to the stereo in the family room just so we can listen to selections. Or, better yet, I may just buy a new CoCo and set it by the stereo. With all these music packages from Speech Systems, the CoCo is quickly becoming an integral part of the stereo system.

The Speech Systems *Music Libraries* are packages that you can really sit back and enjoy. I definitely rate these packages a 97 out of 100. And, no single Library is better than any other. They are all worth getting.

(Speech Systems, 38W 255 Deerpath Road, Batavia, IL 60510; 312-879-6880, $29.95 per Library)

— Cray Augsburg

See You at RAINBOWfest-Chicago April 10-12

About The One-Liner Contest . . .

THE RAINBOW'S One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

Dual DOS Switcher: Simple and Inexpensive

Have you ever thought about making your own customized DOS but put off the project because you couldn't think of a neat and clean way to add it to your CoCo? I like to build project boards, but I like them to plug in. I don't like the idea of hacking away at the innards of my computer.

Well, I have some good news for you. Now there is a simple and inexpensive way to add another DOS to your computer — it's called the Dual DOS Switcher. It's designed to be used inside your J&M Disk Controller. After you have completed the installation, you will be able to manually switch between a 24-pin ROM and a 28-pin EPROM or two 28-pin EPROMs.

Oddly enough, I found I could not install both the J-DOS and the RS-DOS at the same time. Both of these are 24 pin in my machine and this is one configuration the switch does not handle.

While the installation itself is simple enough and requires about 30 minutes to complete, the instructions may be inadequate for those who have never attempted any electronic modifications before.

All in all, the product works fine, and for the price it sure beats trying to come up with your own form of "kludge" to the system.

(CRC Inc., 10802 Lajeunesse, Montreal, Quebec, Canada H3L 2E8; 514-383-5293, $14.95)

— Phil Speed

One-Liner Contest Winner . . .

Run the one-liner on your disk system. When asked for the track number, enter an appropriate response and this routine will print the information contained on every sector of that track to your screen.

The listing:

```
1 CLEAR500:CLS3:PRINT@42,"TRACK
READER";:PRINT@423,"(C)1985 E.D.
WILKES";:PRINT@460,"MACON,GA";:P
RINT@196,"ENTER TRACK # (0 TO 34
)";:INPUTT:FORS=1TO18:DSKI$0,T,S
,A$,B$:PRINT"TRACK#"T,"SECTOR#"S
,A$;B$:FORA=1TO1500:NEXT:NEXTS:F
ORA=1TO2000:NEXT:GOTO1
```

Ernest Wilkes
Macon, GA

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

DDAY: The Invasion of Normandy

DDAY from Ark Royal Games is an excellent historical program that provides hours of fun. This Simulation requires strategy and advance planning as you control the Allies in their fight against the Nazis.

The game is simple to load and execute, and is not copy-protected so backups can be made. After each turn is completed, you may play on or save the setup. This is a plus for war buffs who want to try to work different combinations of forces.

DDAY begins with the design of your invasion force. The seven pages of documentation that come with the program include an example run of the order of battle that is very helpful.

The one restriction of the game is that you are only allowed three fighter bomber squadrons. The Nazi forces are controlled by the CoCo and, in order to get control of the air, you must destroy at least four of the German airfields. If this is not done quickly, your navy and troops suffer.

DDAY is for the more advanced player; novices may have some difficulty getting started. Some knowledge of the Invasion of Normandy is needed. This game rates an 8 on my scale of 1 to 10. Now all I need to know is where to put General Patton and the tanks!

(Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238; 904-786-8603, tape $23; disk $25)

— Keith Smith

One-Liner Contest Winner . . .

Minimon is a miniature monitor that will give you the locations at which your BASIC program and its associated commands are stored. Just type it in and save it to tape or disk in ASCII format. Then merge it in when your program is in memory. To merge *Minimon* from tape use the following line: `OPEN"I",1,"MINIMON":POKE111,255:EXEC44156` and press ENTER.

The listing:

```
10000 CLS:FORX=PEEK(25)*256+PEEK
(26)TOPEEK(27)*256+PEEK(28)-140:
T=T+1:PRINTTAB(7)"LOC"X;PEEK(X)"
 "CHR$(PEEK(X)):IFT/15=INT(T/15)
THENPRINT@489,"PRESS ANY KEY.";:
EXEC44539:CLS:NEXTELSENEXT
```

Keiran Kenny
The Hague, Holland

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

Education Breakthrough

New interactive CoCo software makes learning easy, fun. Kids love it!

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NEW LOW PRICE – 16 lessons for the price of 8! Educational Software for kids from 6 to 18.

Parents are depending more and more on supplemental education for their children. Educators know that the most effective teaching is done one-to-one. Through individual attention and self-paced progress, students learn more and retain more.

BETTER THAN A PRIVATE TUTOR

The Compass Education Software LOOK/LISTEN/LEARN approach is the next best thing to a private tutor. Unlike other educational software the Compass Library also *talks* to the student — not in synthesized speech, but in a real human voice. With on-screen textual information and attention-getting graphics, students of all ages actually enjoy learning!

SELF-PACED FOR BETTER RETENTION

The lessons advance only after the student has correctly answered the questions throughout the programs assuring that the material has been thoroughly absorbed.

SIMPLE EQUIPMENT REQUIREMENTS

All you need is the TRS-80* Color Computer (any model), computer cassette recorder and TV set. Once the cassette is loaded you need only enter two simple commands . . . and then press any key to start the lesson.

Of course you can stop the lesson at any point to study information on the screen. Just push the pause button on the cassette player. Push it again and lesson resumes.

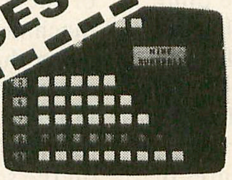
To answer questions throughout the lesson simply press the appropriate number on the computer keyboard, type in the correct answer, or follow other easy instructions. And to go back and review, just rewind the cassette. It's that simple.

CHOOSE FROM 9 SUBJECTS

There is not sufficient space in this advertisement to list all lesson titles, but here is a sample:

MATHEMATICS

In today's advanced, HiTech world, understanding and working with numbers is essential. Compass has developed three comprehensive series of math programs. From basic numerals for the very young, to algebra and higher mathematics for the older child. In between, there are programs for everything from addition and subtraction to practical everyday percentage problems.



① MATH/FRACTIONS
Grades 4 to 8

MF 1 — Numerator, denominator, bar
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MF 3 — Factors and prime numbers
MF 4 — Reducing fractions, reciprocals
MF 5 — Reducing fractions, lowest terms
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MF 7 — Multiplication-division of fractions
MF 8 — Addition-subtraction of fractions
MF 9 — Addition of mixed numbers
MF 10 — Changing fractions to decimals
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MF 12 — Word problems using percents
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MS 5 — Suffixes: paid, quickly, extremely
MS 6 — Suffixes: said, confusion, school's
MS 7 — Homonyms: two, too, to; their, there
MS 8 — Homonyms: our, are, hour; ate, eight
MS 9 — Homonyms: weight, wait; who's, whose
MS 10 – Homonyms: scent, cent; sell, cell
MS 11 – Homonyms: dew, due; course, coarse
MS 12 – Homonyms: cite, site, sight; by, buy
MS 13 – Homonyms: blue, blew, creek, creak
MS 14 – Homonyms: sale, sail; steel, steal
MS 15 – Spelling by Syllables: letter, color
MS 16 – Doubling Consonant Letters: hollow

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CoCo III Secrets Revealed Offers Good Information

The Color Computer 3 market is presently in somewhat of a waiting state. Color Computer software/hardware vendors are busy trying to get new products for the CoCo 3 while most owners of the new machine are waiting (impatiently) for those new products. When the new products are finally released, I imagine there will be quite a rush of CoCo 3 sales. However, what do we do while we are waiting? The daring, technically-minded people who dabble in programming will want to pick up *CoCo III Secrets Revealed*, a 34-page information manual for the CoCo 3.

The manual contains six chapters that discuss features of the new machine, and gives a modest memory map. Chapter 1 covers the basics of the Memory Management Unit (MMU) as well as explaining how the palette registers work. It includes a subjective chart of what values give what colors in the palette registers. Chapter 2 lists and briefly describes the new commands in the CoCo 3. This really is useless, as anyone who owns a CoCo 3 already has the manual, and this chapter doesn't give enough specifics to help anyone who doesn't have the new machine. Chapter 3 goes back to discuss some of the finer aspects of altering the palettes. This chapter also includes several "you type 'em" examples of how to access some fancy features. Chapter 4 is a tidbits chapter. It covers smooth scrolling of graphics, a memory test program for 128K and 512K versions of the CoCo 3, and several peeks and pokes to control the video output. Chapter 5 is devoted to an eight-page memory map. This map does not fill the need for a good disassembly of the machine. However, it does provide a great deal of information regarding operational "modes" of the CoCo 3 and where to go to control I/O on the new machine. Those technically-oriented people will be able to discern a good deal of useful information from this chapter. Finally, Chapter 6 is a brief summary. The last page of *CoCo III Secrets Revealed* gives the pinouts for the RGB jack located on the bottom of the CoCo 3 and also for the GIME chip. These diagrams are rough, hand-drawn pictures which might indicate they were thrown in at the last minute.

All in all, *CoCo III Secrets Revealed* offers some very good information which will be helpful to advanced as well as intermediate programmers. I do feel, however, the manual could have been reduced to about 10 pages and still contain the same amount of useful information. The price is not too high, especially since we are all waiting for CoCo 3 products.

(Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414; 718-835-1344, $16.95 plus $3 S/H)

— Cray Augsburg

Physics: The Study of Motion, Matter and Energy

The software library from York 10 Software consists of five main courses which cover standard school curriculum. Each study course consists of two volumes of material with eight cassette tapes in each volume, for a total of 144 individual lesson plans.

This library is only available on cassette tape because it contains both audio and visual presentations. The first cassette in each volume contains the loader used to run all of the lessons in that volume. As the loader is written in machine language, you need to follow this procedure when using these programs. First, insert the first cassette in the cassette player and rewind it. Then turn on your CoCo and monitor, and type `CLOADM:EXEC` and press ENTER. When the program is loaded and running, just follow the prompts on the screen.

While you are using these lesson plans, you can stop the program at any time by pressing the pause key on your cassette player. If you don't have a pause key, just stop the recorder. You can also rewind or fast forward the tape so that you can review or skip any section of the lesson plan.

Physics is defined as the study of motion, matter and energy, and their interactions. Everything in our universe is governed by these laws. Are you curious about physics? What are light and sound waves? How does electricity work? For the answer to these and other questions, you can use one of the lesson plans contained in the Physics/Science study course.

Volume One takes you through the study of motion, matter, sound, light and optics, and wave motions. Volume Two takes you through the study of electrons, AC voltage, solid-state electronics, the elements, atomic and nuclear physics, and the theory of relativity.

Although the instruction book states that these lesson plans are made so that students of all ages can explore these concepts, each lesson plan starts out by telling you that the study of physics is a hard subject and that you should go back and review any previous lessons until you have a firm grasp of the concepts discussed. I fully agree with this disclaimer.

My son Eddie, who is 8 years old and in the third grade, was curious about this software. One night, he sat down in front of our CoCo and went through the Sound and the Light and Optics lessons. Although he finished both lessons, I don't think he really comprehended the concepts that were being explained. I would, therefore, suggest that these lessons be used by students who are older.

I tried the courses on AC voltage and solid-state electronics. I was impressed. These courses are set up in such a way as to explain the subject matter in a concise and entertaining way.

If you are curious about physics and the laws that govern our universe, then these programs will be very useful to you.

(York 10 Software, 9525 Vassar Avenue, Chatsworth, CA 91311; 818-700-0330, $49.95 per volume plus $3 S/H)

— John H. Appel

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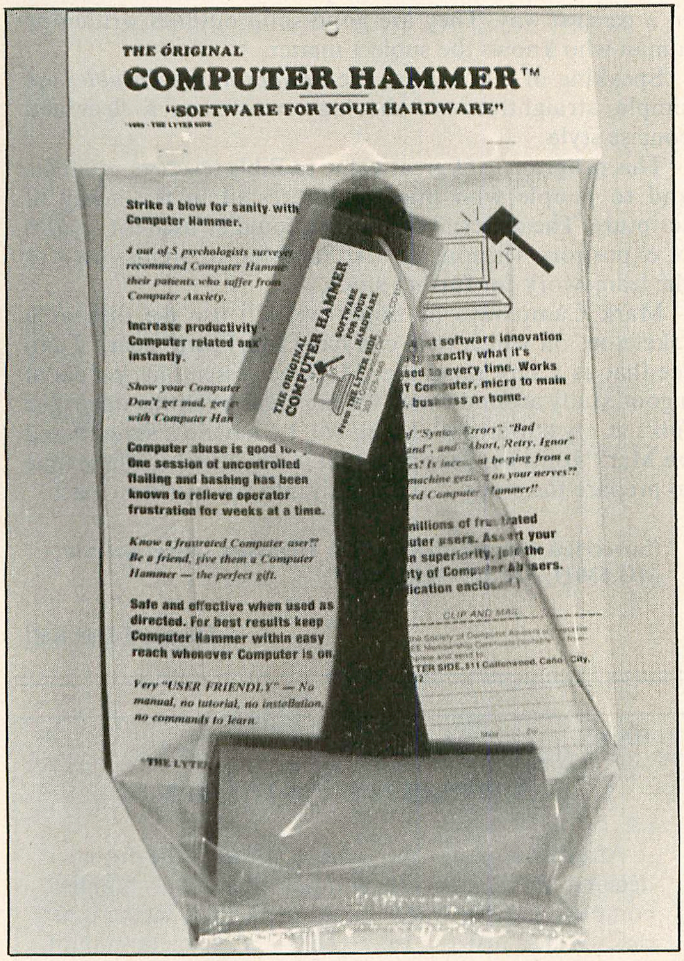
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— Angela Smith

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Note: Our Fourth and Fifth Year Indexes, including RAINBOW ON TAPE indexes, are included in the July 1985 and 1986 issues, respectively.

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Studies in the Parables Provides the Framework for Bible Study

Studies in the Parables is a welcome addition to the growing selection of Bible-based programs, and another fine offering from the Rev. Mark S. Camp and Sovereign Grace Software.

Like other Sovereign Grace programs, *Studies in the Parables* consists of disk text files along with a printing utility. The text files may be printed out on any word processor or by using the built-in text processor.

There are a lot of big words one can use when talking about the study of the Holy Scripture, but Mark Camp doesn't use them and I don't either.

I will make no attempt to judge or comment on the theology of these studies. I only want to evaluate their use in a general way. They are good solid outlines written by a man who knows the subject matter.

Speaking of that aspect, the *Studies in the Parables* are simple, straightforward theology, written in a clear and concise style.

This program is of great value to Bible teachers, students and to people who may be interested in the study of scripture. The material on the disk could be used for a series of expository sermons on the Parables, or simply used as the framework for further study.

Mark Camp says he hopes we will use the disk as a "skeleton, on which (we) can hang (our) own meat." I can see that as a very good use. Mark has essentially prepared a good study around which we can build a commentary. The folks at my storefront church will be having a series based on Mark's outline. I suppose that is why he took all the time to prepare the study — to send it into the world to teach.

(Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011; 314-227-3238, $9.95)

— Howard Lee Ball

Hint . . .

Attractive Solution

After finding out the price of a bulk tape eraser, I decided there must be another way to accomplish complete erasure of tapes. A quick look in the junk box yielded just the right tool — a magnetic mount for a CB antenna. Any large magnet should do. Just rub the magnet in a circular motion several times over the tape on both sides. You can then use the tape to record sound or data. Though I haven't tried it yet, this should also work with VCR recording tape. Be sure to store and use the magnet far away from your tape collection so that you don't inadvertently erase other tapes, too.

Jack Demaree
Versailles, IN

Pick a Winner With *The Lottery Player*

If you are like millions of other people, you may have spent a buck or two on a lottery. Twenty-two states and the District of Columbia, along with Canada and Australia, are currently operating lotteries. Their popularity and increased revenue are attracting more and more states to consider them as ways to supplement declining tax bases.

Suzanne Spencer Software now offers for your 64K Color Computer *The Lottery Player*, which claims to increase the chances of winning lotteries. The program is available on either tape or disk and is not copy-protected, so backup copies are no problem. The purchaser should specify what state or national lottery version is wanted when the order is placed.

Most people who play lotteries select numbers based on some scheme like their birthday, social security number, address or other combination of numbers. Sometimes you might get lucky, but the odds of winning using such picks are very slim. Dave Gentry, the author of *The Lottery Player*, has done some serious studying in the area of mathematical probabilities and has developed a unique computerized approach to selecting lottery picks. The methods that Dave discusses in the 10-page set of instructions require that you utilize the method of Wheeling Numbers. This method, along with the purchasing of multiple Lotto tickets each week, will help you become a winner. The author is wise to point out that while there is no guaranteed return for the money you invest, you will see an improvement in your winnings that can be verified before any money is spent by keeping track of the winning numbers for a period of time.

The program requires that the user enter the winning lottery numbers each week in the program's data statements. In this way the computer is able to determine the most frequently called numbers, which forms the basis of the Wheeling system.

Wheeling systems take a set of numbers and then combine them into various combinations of six numbers each. All of the possible combinations are not used because most of us could not afford the cost of the thousands of tickets needed. There are normally 38 to 42 sets of six numbers each that are derived, and the program produces a sufficient number of combinations to give an increased chance of winning. Since the odds of winning first place are slim, the best this program can do is improve those odds and increase your chances of winning second, third and fourth place money. You may not win the big one but the small stuff adds up, too!

The Lottery Player uses the abbreviated Wheeling system so the average player can afford the cost of the weekly lottery tickets. The program allows you to select 12, 14, 16 or 18 numbers that will be Wheeled into 38, 40 or 42 combinations of six numbers each. Three methods of number selection are used and shown in the five main menu options.

In Option 1, you are prompted to pick up to 18 numbers and the numbers are Wheeled.

Option 2 allows you to select the last 10-week period that you have winning Lotto ticket numbers for. Since it utilizes only the last 60 numbers that have been drawn, it is often considered the best way to select the "hot" numbers. This option analyzes the winning numbers from the last 10 weeks and selects only those numbers which have appeared more than twice in that period. Ticket combinations are presented on the screen and to the printer if you want.

In Option 3, the computer generates the most frequent numbers that have appeared between a beginning and ending period. These numbers are then compared to the amount of numbers you chose for Wheeling purposes and all of the other numbers are discarded. The various ticket combinations are displayed on the screen or to the printer.

Selecting Option 4 lets CoCo analyze any of the three methods chosen using data from the previous weeks of winning numbers. You can see the number of tickets Wheeled and the cost of those tickets.

The final option sends a chart to your printer and shows, graphically, the frequency that each number in your lottery appeared in the previous weeks.

This program does a lot with lottery information. It utilizes the CoCo and an optional printer to take full advantage of the Wheeling Number System. I urge any of you who play lotteries on a regular basis to use this program to improve your chances of winning. With this software, a CoCo and weekly purchases of lottery tickets, you may become the first millionaire on your block!

(Suzanne Spencer Software, 4176 47th Ave. NE, Salem, OR 97305; 503-390-6664, tape $21.95; disk $24.95)

— David Gerald

One-Liner Contest Winner . . .

Hexdump is a short program that will present a hexadecimal output to your screen of the contents of a given block of memory. Just enter the start and end addresses of the block of memory you wish to see.

The listing:

```
10 INPUT"START ADDRESS: ";X:INPU
T"END ADDRESS: ";Y:FOR Z=X TO Y
STEP 8:PRINT HEX$(Z);": ";:FOR W
=Z TO Z+7:M$=HEX$(PEEK(W)):IF LE
N(M$)=1THENM$="0"+M$:PRINT M$;"
";:NEXT W:PRINT:NEXT Z:GOTO10:EL
SE PRINT M$;" ";:NEXT W:PRINT:NE
XT Z:GOTO10
```

John Wells
Herndon, VA

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape*.)

Create Labels With *Ultra Label Maker*

I like to think of myself as an organized and precise individual. However, when it comes to labeling disks in my rather large disk library or addressing a quick envelope to RAINBOW magazine, I always seem to be just barely able to scribble it down with my trusty, felt-tipped pen. Well, look out world, now that I'm armed with *Ultra Label Maker* from Bob van der Poel Software, no more fooling around with handwritten scribbles. I can now, with very little effort, create the neatest labels you have ever seen. (Last I heard, my wife and kids were drafting a letter of thanks to Bob.)

Ultra Label Maker comes in either a cassette or disk version, requires 32K Extended BASIC and is not copy-protected. One of its most important features is its compatiblity with any and all printers. Owning a DMP-120, I usually suffer heavily when purchasing any printer-related software. This program is one of the few exceptions. The software allows this compatibility by letting you create your own printer driver. However, unlike some programs with the same option, you do not have to be a programmer or hacker to generate the driver. The *Ultra Label Maker* disk also contains a program called Fontedit which takes you step by step through the creation of your own printer driver. Fontedit lets you set up from one to nine control code sequences for printer functions such as Italics, NLQ, Elite, Condensed and others. What's more, when you run the actual Label program it allows you to mix and match any of the fonts for each and every line. It even takes into account the different type sizes, such as "expanded" and adjusts the number of characters allowed on the line.

The program also lets you set the size of the labels, allowing for any size mailing label or other label on the market. I have some rather large 5-by-1.5-inch labels and it handled them perfectly. As with the font styles above, the number of characters prompted for on each line changes with the size of the label. Also, the data entered may be automatically centered, left or right justified or left as is at your discretion. Of course, each label can be saved for reprinting or modifications at a later date.

At this point, I have described what is possibly one of the most user-friendly and practical label-making programs on the market today. However, Mr. van der Poel didn't stop there, but added two more options to further enhance the program. One option is called Merge File Print, which sets up a label "mask" using the features I described earlier and has the program read an ASCII file of names and addresses, and generate a label for each. Each blank line in the mask is replaced by a line from the ASCII file. This means you could put fixed information in the mask to appear on every label and input the remaining variable information from the file. The file is easily created with any word processor capable of ASCII output.

The other option allows each label to be printed with a sequential number for raffle, event or hat-check tickets. The starting number and increments are user-definable to the point of allowing a negative increment and the placing of the number anywhere within the label.

By now, you may have guessed that I was impressed by this program. For those of you who have *TelePatch*, also by Mr. van der Poel, you already know the forethought and precise planning that goes into his products. Being a professional programmer myself, I really appreciate a quality piece of software when I find it. Also included with the program is an extremly clear and well-written manual ranking among the best documentation I have seen in a long time. If you need to create labels of any kind, you couldn't possibly go wrong with *Ultra Label Maker.*

(CMD Micro Computer Services, 10447 124th Street, Edmonton, Alberta, Canada T5N 1R7; 403-488-7109, $14.95)

— Ken Boyle

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Hint . . .

Great Racks, CoCo Stacks

Several department stores carry small metal grid racks that fit onto your cupboard or closet shelves. They are intended to hold such things as plates, towels or just about anything. With that in mind, I decided to use one to hold my CoCo equipment. It works perfectly! Just place it right over your CoCo (many of them even work well if you have a Multi-Pak Interface) and set your monitor and/or disk drives on them. Buy two and use one for your printer. These racks are great and, best of all, they are very inexpensive!

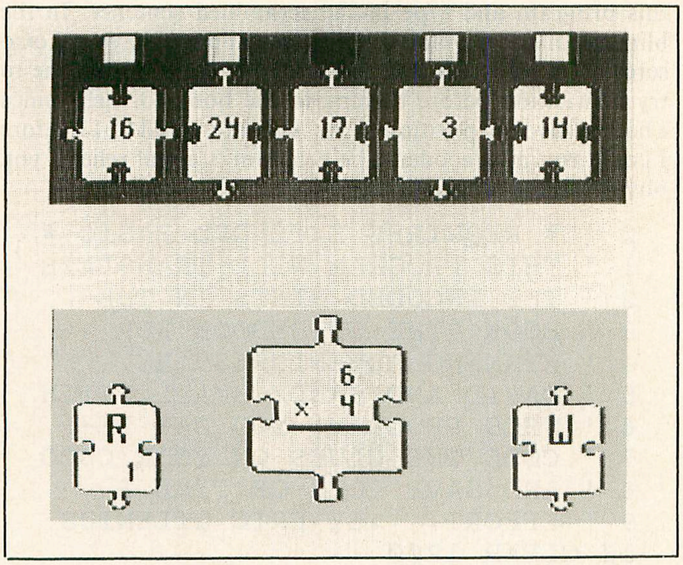
Stephen A. Haughey, M.D.
Whitefish Bay, WI

Get the Total Picture With *Puzzle Math*

Only a generation ago one of the major ways of drilling math facts was the use of the flash card. The problem was written on one side of the card and the answer was on the other. The student used the cards individually or the teacher used them in class, many times in the form of a game. With the advent of the microcomputer, software authors began writing drill-type software that mimicked the flash card. Numerous programs have been written that provide drill of math facts. These are available either commercially or in past issues of THE RAINBOW. Certainly, one could easily argue that we don't need any more math drill programs. However, for those who might be looking for a program that would also make the process of reviewing math facts interesting and fun for the child, consider *Puzzle Math* by SECA.

Puzzle Math, which requires 64K with Disk Extended Color BASIC and one disk drive, does everything that the old flash cards did and more. Each time the student answers the problem correctly, a piece of a picture (puzzle) is displayed. Thus, there is an incentive to keep answering the questions in order to see the complete picture. The program disk comes with 18 pictures that the computer randomly selects at the beginning of the program.

Puzzle Math starts out with a menu of the four math functions — addition, subtraction, multiplication and division. Having selected one of these functions, the next menu prompts for the range of difficulty. There are four ranges of difficulty, approximately corresponding with grades two through five. The third and final menu prompts for the number of puzzle pieces (problems), 8, 12, 16, 24 or 48.



After answering all of the prompts, a graphics screen appears and presents five possible answers from which to choose the correct one. If the correct answer is entered, the screen reveals another puzzle piece; if an incorrect answer is entered, you are given a second chance to enter the correct answer. The program continues in this manner until all pieces have been revealed. Then, a score card is shown that gives the total problems attempted, number of problems answered correctly and the number of problems answered incorrectly.

Now you are probably thinking all this sounds great, but what happens when the child gets tired of the 18 pictures provided with the program? No problem! Simply use any picture that is drawn in either `PMODE 3` or `PMODE 4` by any of the popular graphics editors. Simply rename the picture as `PICT`*N*`.BIN`, where *N* is a number between one and 18, and copy it to the program disk. Details for this procedure are provided in the manual.

Puzzle Math is a very good piece of software that does exactly what is claimed. The 18 pictures are very detailed drawings that are of interest to children. One aspect that I did not like was with the 3rd and 4th levels of difficulty for both multiplication and division. Too many of the problems were of the form N x 1, N/1, and N/N. In my opinion, such problems are much too easy for a fourth or fifth grader. Otherwise, *Puzzle Math* is a very good program that I would recommend for young children. I should also note that SECA includes a free box of 10 DS/DD disks with the purchase of *Puzzle Math*.

(SECA, Southeastern Computer Arts, P.O. Box 3134, Gulfport, MS 39505; 601-832-8236, $24.95)

— Donald Dollberg

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THE RAINBOW, December 1984
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Color Micro Journal, February 1985
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Book Review

Clue Yourself in With *The Guidebook for Winning Adventures*

By Eric Tilenius

On the front cover of *The Guidebook for Winning Adventures* by David and Sandy Small is a message written in small white type: "If you haven't discovered Adventure games, you don't know what you're missing. If you have, you need help!" And help is just what this book is about.

In the past, lone computer Adventurers have had two choices when baffled by some puzzling situation — scream and try to work it out on their own, which could indeed take months; or madly call a friend at 2 a.m. and ask for help. Somehow, I always got stuck doing the former, as calling friends at two in the morning provoked rather unfriendly remarks. The matter was made worse when Infocom entered the CoCo Adventure scene. Infocom's games were just so wonderfully addictive, I often ended up agonizing over mysteries for days on end. But, just as matters seemed to get worse, they suddenly improved.

Enter *The Guidebook for Winning Adventures*. It gives hints, clues, maps and outright solutions to some of Infocom's fabulous games. These games (all available for the Color Computer from either Radio Shack or Infocom) are *Enchanter*, *Infidel*, *Planetfall*, and *Zork I*, *II* and *III*. Both the authors and I suggest not looking at the outright solutions until you have completed the Adventure, as being handed the solution takes all the fun out of an Adventure. The book also offers tips on Adventures in general and includes a brief section on how Adventure games are written. These sections are not very detailed, but provide a background in Adventures for those not familiar with them.

The main bulk of this book — 299 pages, to be exact — is devoted to giving clues to the six Adventures mentioned above. These sections are similar to the *InvisiClues* booklets marketed by Infocom. There are, however, two chief differences between *The Guidebook* and Infocom's *InvisiClues*: One works to this book's advantage, and the other to its detriment. The first difference is cost. *InvisiClues* provides hints to just one Infocom game and costs $7.95, while for $9.95, *The Guidebook* gives hints and maps to six games.

The publisher, however, had a problem with *The Guidebook*: Namely, how to hide the clues so that a reader didn't ruin his game by looking down a page and seeing all the answers to all the puzzles. The *InvisiClues*, as its name suggests, accomplishes this by putting clue answers in invisible ink and providing a decoding pen. This technique, however, would be far too costly in a 300-plus page book. Instead, the authors provided scrambled answers to clue questions. Thus, if you are stuck in a certain part of an Adventure, you need only find the appropriate question in the clue book that describes the situation and unscramble (by means of the given key) the answer to this question.

For instance, if you were playing *Planetfall* and wanted to find out how to fix the broken coolant system, you would simply turn to the chapter on *Planetfall*, find the section on The Tower Core Area (which is where the coolant system is located), then look for the question, "How can I fix the coolant system?" Unscramble the scrambled clue, and voila!

After using *The Guidebook* for a while, I soon became quite weary of unscrambling clues by hand. That's when I wrote the program enclosed with this review. Simply `RUN` this program and type in the scrambled sentence. In the blink of an eye, the plain English clue appears on your CoCo screen. I also found that using this program forced me to try a situation before turning to the book for help, since I had to save my position in the Adventure and `QUIT` before I could run my decoder. The program is a real relief if you buy this book — give it a try.

```
0 ' * REQUIRES EXTENDED BASIC *
1 ' THIS PROGRAM WILL TRANSLATE
2 ' THE ENCODED HINTS IN THE
3 ' BOOK "THE GUIDEBOOK FOR
4 ' WINNING ADVENTURES" BY
5 ' DAVID AND SANDY SMALL. WITH
6 ' THIS PROGRAM, YOU CAN DE-
7 ' CODE THE CLUES ON YOUR COCO
8 ' AND SAVE LOTS OF TIME &
9 ' EFFORT.  >BY ERIC TILENIUS
10 CLEAR 1200
15 CLS
20 FOR C=65 TO 90
30 A$=A$+CHR$(C)
40 NEXT C
50 LINEINPUT"TRANSLATE>";B$
```

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```
60 PRINT
70 FOR C=1 TO LEN(B$)
80 M$=MID$(B$,C,1)
90 IF INSTR(1,A$,M$)>0 THEN M$=C
HR$(ASC(M$)-1):IF ASC(M$)=64 THE
N M$="Z"
95 MID$(B$,C,1)=M$
100 NEXT C
110 PRINT"* ";B$
120 PRINT:PRINT"HIT ANY KEY TO R
ESTART";
130 IF INKEY$=""THEN 130 ELSE RU
N
```

One thing I like about *The Guidebook* is that it has different levels of clues for each question. The first clue gives a gentle nudge in the right direction, the second a big push, and the third clue usually tells you the answer straight out. This way, you get only the clues needed. Sometimes the first clue is a bit sarcastic. For instance, upon de-scrambling the first clue to the question, "What is the chemical dispenser used for?" one is greeted with the very helpful clue, "dispensing chemicals"!

In addition to the clues, *The Guidebook* offers a list of all the objects used in the Adventure and their purposes, a section containing maps of each Adventure, and an "Order of Play," which gives the complete step-by-step solution to each Adventure.

With the aid of a couple of friends, I tested a major portion of the hints given by this book and found the book to be quite comprehensive as far as providing the answers to any possible question a player might have. I checked the maps in the book against those I had drawn up and found that those, too, seemed complete and accurate.

I did come across a few errors in the step-by-step solution section, though. For instance, under the section for *Planetfall*, you are told to get out of the safety webbing after the pod lands under water. If you wait this long while playing the game, though, you'll never make it to the surface. You must get out when the pod first starts to sink. In another case, you are told to put the flask in the machine shop, and then later told to pick it up while in the "Corridor Junction." Boy, that flask moves fast! However, with a few minor exceptions such as these, the step-by-step solutions worked and even gave the correct number of points you obtained for each puzzle.

Despite the annoyance of having to unscramble clues (made easier by the program below), and the few minor inaccuracies this book contains, I would recommend it to anyone who has, or is planning on buying, any two or more of these games. If you only have one of these games and aren't planning to buy more, Infocom's *InvisiClues* is cheaper and easier to use. However, this book is a great companion to any Adventure game lover, and, unlike the *InvisiClues*, can be passed on to a friend who is having troubles with other games.

(David and Sandy Small, Baen Enterprises, 8 West 36 Street, New York, NY 10018; 212-947-8244, $9.95)

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VIP Writer Enhancer Provides Helpful Additions

If you use *VIP Writer*, this BASIC utility from Foxx Software will interest you. It allows you to use text files created by *VIP Writer* in another context, such as uploading them to a BBS. Or if you prefer, you can download files from another word processor or BBS and modify them for use with *VIP Writer*.

VIP Writer Enhancer reads any text file from disk and then modifies it as specified and creates a new corrected file while leaving the original intact.

The program is very easy to use. After running it, you are greeted with the Main Menu. A full complement of options is available to allow you to perform other useful disk functions without exiting to BASIC.

The first option allows you to Convert *VIP* to ASCII files. Since *VIP Writer* does not add a carriage return at the end of a line, problems are likely to occur when trying to upload to a BBS or read a *VIP* file on another word processor. Since each paragraph is saved as one long continous line, you'll get a rather cluttered text file on any other word processor. This option adds carriage returns at the line length specified at the prompt and also enables word wrap.

The next option is converting ASCII to *VIP* files. It removes carriage returns so when reading a file into *VIP Writer* it will be readable again. Without this option, reformatting the *VIP* file would be a real chore.

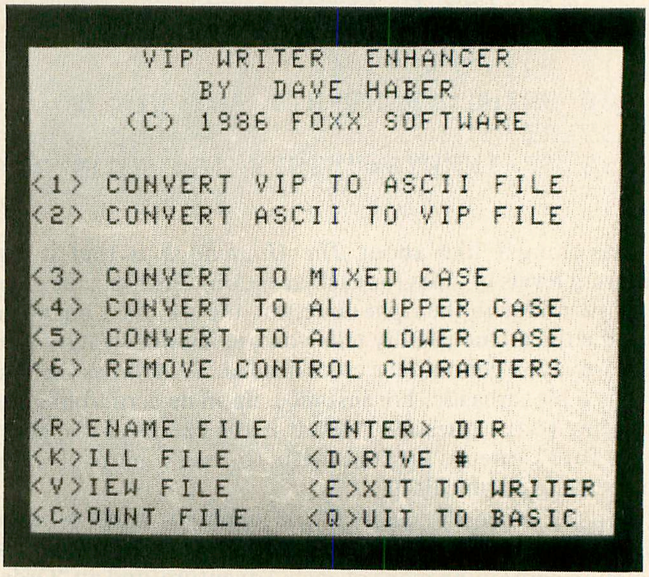
A handy option allows you to convert to mixed-case that modifing a file written in all uppercase and changing it to lowercase, leaving only the beginnings of sentences capitalized. It can't recognize proper names, though, but you can easily correct that in your word processor. This is nice in those cases where you downloaded a file from a BBS that doesn't use lowercase. The next two options allow you to convert to all upper- or lowercase. You might want to use these options for uploading to a BBS that requires all uppercase or all lowercase.

Remove Control Characters comes in handy when mixing files from various word processors where control codes are likely to be different. It's also handy for fixing downloaded files from BBS's.

The Rename File option is like BASIC, but easier to use. Just follow the prompts. The Kill File option is also like BASIC, but prompts help prevent accidental killing of files.

View File displays any file on the screen. Uses the space bar to start and stop and the up/down arrows to go forward or backward one screen at a time. Count File displays the character count of any file. Drive # selects what drive your files are in, and Exit To Writer restarts *VIP Writer* if a copy of *VIP* Writer is on the enhancer disk, or if *VIP Writer* is in Drive 0.

A feature I liked was the default file extension automatically added by the program. This results in a quick and accurate way to determine which files have been modified. When you select any of the options you will be prompted with `FILENAME ?` After the program reads in the filename, it asks you `NEW NAME ?` For example, if you had a VIP file on your disk named `TEST.VIP` and you selected option 1, you would answer the `FILENAME ?` prompt with `TEST`. The file `TEST.VIP` would be read in and then you would be asked `NEWNAME ?` By simply typing `TEST`, the program adds the extension `ASC` to `TEST` so that the new file is called `TEST.ASC`.



```
   VIP WRITER  ENHANCER
        BY  DAVE HABER
   (C) 1986 FOXX SOFTWARE

<1> CONVERT VIP TO ASCII FILE
<2> CONVERT ASCII TO VIP FILE

<3> CONVERT TO MIXED CASE
<4> CONVERT TO ALL UPPER CASE
<5> CONVERT TO ALL LOWER CASE
<6> REMOVE CONTROL CHARACTERS

<R>ENAME FILE   <ENTER> DIR
<K>ILL FILE     <D>RIVE #
<V>IEW FILE     <E>XIT TO WRITER
<C>OUNT FILE    <Q>UIT TO BASIC
```

The automatic extensions are `.ASC` (convert VIP to ASCII file), `.VIP` (convert ASCII to VIP file), `.MXC` (convert to mixed case), `.AUC` (convert to all uppercase), `.ALC` (convert to all lowercase), `.RCC` (remove control characters) and `.NEW` (rename).

A six-page, spiral-bound notebook provides complete and easy to understand documentation. Instructions are provided to allow the user to customize the program. You can change the default extensions, characters per line, highest valid drive and display options.

This program is a nice addition to *VIP Writer*. It provides some helpful additions to an already popular program.

(Spectrum Projects Inc, P.O. Box 264, Howard Beach, NY 11414; 718-835-1344, $19.95 plus $3 S/H)

—Jerry Semones

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Getting the Max From *MiniDOS9*

In this day and age when many utility programs claim to do everything from whitening your teeth to picking up the kids after school, it is very refreshing to see a program developed that claims little but does everything it states — perfectly. This program is Cir-Pak Limited's *MiniDOS9*. *MiniDOS9* is a utility package that allows Cir-Pak Limited's SC68008 coprocessor card to communicate with OS-9. You must have both the coprocessor card and OS-9 to have any benefit from this package.

MiniDOS9 can best be described as a "mini" monitor that allows one to communicate directly with the SC68008 card. The monitor contains what I consider to be the core routines that are necessary to debug software and gain an insight into the internal workings of a microprocessor-based system. There are essentially three types of commands that *MiniDOS9* allows you to perform: memory display and alteration, program loading and execution, and software debugging. All commands are one keystroke in length and are entered from the main menu.

The memory commands allow for the displaying and changing of single bytes, the copying of blocks of memory from one place to another and the dumping of 80 contiguous memory locations to the screen. Typically, one tells the monitor which memory location he would like to work with and then is allowed to either display the contents of that location (or locations), change its value or bump the memory location pointer. The program loading and execution commands are quite simple, but necessary. One can load data from the CoCo's memory to the SC68008 and from the SC68008 back into the CoCo. Program execution is also made possible.

The software debugging commands are what I found the most useful. They allow the user to trace a program's execution and stop at any point in the program, or to step through each instruction one at a time. The user is allowed to place up to five breakpoints in the code that is to be debugged. Whenever one of the breakpoints is encountered by the program, it halts and gives control back to the monitor. The user can then either check the status of the program by dumping the registers or he can manipulate the program or address space. The program can then be resumed with a single keystroke. If one finds that he wants to check a particular area of the code but doesn't like the idea of constantly setting and resetting breakpoints, he can cause the program to go into single step mode. From here, each instruction is executed singly and then control is given back to the monitor. These are essential commands if one wants to debug machine language programs.

In addition to the three types of commands, there are provisions to execute any of the normal OS-9 commands from the monitor. This is done by invoking the shell from inside the monitor. Two of the normal OS-9 commands, `chx` and `chd`, are provided directly from the monitor so that a shell invocation does not have to take place.

To those who own an SC68008, *MiniDOS9* is one of those few basic necessities that one should not be caught without. I had no problems with the documentation, since there was very little printed material (none was really needed). I had no problems with the software itself and found everything to be exactly as I had expected.

MiniDOS9 does not claim to do everything, but what it does do, it does very well. It is casually elegant.

(Cir-Pak Ltd., P.O. Box 410, Varennes, Quebec, Canada J0L 2P0. Also available from Orbit Electronics, P.O. Box 613, Derby Line, VT 05830; 819-876-2926. Coprocessor card, assembled and tested with 256K DRAM, $399 U.S.; *MiniDOS9*, $59 U.S. plus $4 S/H)

— J. Kleinwaechter

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Wavy Word Pak

By Marty Goodman
Rainbow Contributing Editor

• *I find my Word Pak produces an image on my screen that "waves" slowly, but is otherwise sharp. Can this be fixed?*

Bill Jackson
(BILL JACKSON)
Sacramento, CA

I have seen the same problem on all models of Word Pak. There are two ways to approach the fix. If you are comfortable with modifying ML software under RS-DOS and modifying drivers under OS-9, you can alter the fine vertical timing constants in the initialization program for the Pak.

Alternately, and probably a simpler approach, you can solder a trimmer capacitor onto one or the other side of the crystal of the Word Pak, going between the lead from the crystal and ground. Typically, one in the 5- to 25-picofarad range will do the job. Then adjust this cap until the waviness on the screen goes away. (Bill Jackson gave me this follow-up on Delphi a few days later: "A 20 pF cap worked. My screen now looks fine.")

CoCo 2 Upgrade

• *I'm having trouble upgrading a CoCo 2A. How do I upgrade it to 64K? I already have the two needed 4464 RAM chips. How do I add Extended BASIC?*

Gary McMillian
Battle Creek, MI

To the left of the 6821 chip in the front of the circuit board is a single pair of pads labeled J6, 64K and RAM size. You must solder a wire between those two pads on the board. Then replace the two socketted 4416 chips with the two 4464 chips you bought. This will complete the 64K upgrade of that board.

To upgrade to Extended BASIC, you must first buy the Extended BASIC chip and manual (price is about $40 from Tandy). You must specify exactly what catalog number CoCo you have for them to order the right chip. Clip the soldered jumpers J1, J2, J3, J4 and J5 from their current 64K position setting and solder in new jumpers in the 128K postion. J2 through J5 are located together side by side, and J1 is located a little farther away. All are near the 24-pin ROM chip that is sitting in a 28-pin socket. Remove the old ROM chip and replace it with the 28-pin ROM you bought. This completes the upgrade to Extended BASIC. Note that the "64K" and "128K" on J1 through J5 refer to the number of bits in the ROM chip, and do *not* refer to any 128K memory upgrade for the CoCo 2!

Multi-Pak Extension Cord

• *I just bought a Multi-Pak, and find it does not quite fit on my desk with my CoCo. Where can I get an extension cable so I can position it on a shelf above my computer?*

Tom King
(CAPNCRUNCH)
Winter Haven, FL

I strongly urge you *not* to use such an extension cable. Though they are made and sold, using one can decrease the reliability of the operation of your computer. The unbuffered bus of the CoCo was not designed to have its signals sent down several feet of ribbon cable. Note that some CoCo systems will appear to function fine with such an extension cable, but I would not trust such an arrangement.

Double-Sided, 80-Track Drives

• *I am using OS-9* Profile *on a 64K CoCo 2. With it I have a Tandy FD-500 single-sided, 40-track drive. I'm interested in installing double-sided, 80-track drives. Where can I get one, and what software will I need?*

Reuben Pressor
San Antonio, TX

OS-9 is well-suited for using a variety of disk drives, including the 80-track, double-sided variety. These are sold from many different venders, including True Data Products, who advertise in RAINBOW. You will need to install disk device drivers and descriptors appropriate for 80-track drives. These can be purchased from D.P. Johnson, 7655 S.W. Cedarcrest St., Portland, OR 97223; (503) 244-8152. Ask for their *SDISK* package.

Hot-Running SAM Chips

• *I'm interested in what you can tell me about the old SAM chips that run hot. I will be making some heat measurements on mine soon.*

Damon Hill
(DWHILL)
Atlanta, GA

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

I am told that Motorola made a number of changes in the mask of the SAM chip over the years. The early ones seemed to run much hotter than the later ones, and certainly were more likely to cause subtle crashes on the CoCo, particularly during disk I/O due to less than perfect internal timing. SAM chips made after January 1984 were of a significantly superior mask than their predecessors. The new SAM chip used in 'A' and 'B' model CoCo 2s (the 74LS785) is significantly better than the old 6883 (74LS783), and it is usable in the older units. But, of course, if your CoCo 1 or 2 is working fine right now, I do not advise changing the SAM chip.

Looking at RGB Monitors

• *For my CoCo club, I am evaluating different brands of RGB analog monitors for possible use with the CoCo 3. What should I look for? Stripe width, bandwidth, or what?*

Joe Register
(MAGUSII)
Naperville, IL

With color monitors, stripe width (or in the case of super-fine monitors, dot pitch) in millimeters correlates in some degree to the sharpness of the image. The CM-8 has a dot pitch of .52 mm. The Magnavox 8CM515 (professional) monitor that is becoming popular with Color Computer 3 users offers a dot pitch of .42 mm. The Magnavox 8CM643 has a stripe width of .39 mm. The Teknika MJ305 offers a stripe width of .41. The Magnavox 8CM505 model offers a dot pitch of .65 mm.

There are many other factors involved in determining what the image of a monitor looks like. These include anti-glare properties, number of video input signal connections, flatness of focus from edge to edge, and linearity. If the stripe widths are similar, there is no way to be sure which monitor looks better unless you look at the display on them yourself.

The Magnavox and Teknika units mentioned all offer compatibility with CoCo 1s and 2s, VCRs, and IBM PCs (they possess RGB I, RGB A and composite video input capability). The CM-8 can be used only with a CoCo 3, and cannot show artifact colors on CoCo 1 and 2 software. The Magnavox 8CM515 also offers excellent anti-glare coating.

Bandwidth is a figure that relates to the ability of the electronics at the input of the monitor to respond to a rapidly changing signal. Typically the bandwidth of the monitor will be more than adequate for it to display an image to the full capability of the resolution of its picture tube, as measured in stripe width or dot pitch.

A rule of thumb suggested to me by Ed Ellers: Monitors with stripe widths greater than .50 mm are really not suitable for resolving 80-column text. The 8CM505, with a stripe width of .65 mm, turns out to be unusable in most of the CoCo 3 80-column modes. It does resolve 320-by-200 graphics quite nicely.

Hooking Up 3½-Inch Drives

• *Is it possible to hook a 3½-inch drive to the Color Computer? If so, what steps are necessary?*

George Ellenburg
(ELLENBURG)
Edgewood, FL

The 3½-inch disk drives are the exact electronic equivalent of 5¼-inch, 80-track, double-sided drives. Both have 720K data storage capacity. The signals on all of the lines of the 3½-inch drive are identical to those of the 5¼-inch drive, so the two are electronically interchangeable. The only electrical problem is that 3½-inch drives use a dual-row header connector (two rows of 17 pins in parallel) instead of the 34 land edge card connector that is standard on 5¼-inch drives. Thus, you will have to make up or modify a cable on your own. The connector you need is a female 34-pin, dual-row header IDC-type connector; Radio Shack sells it as part number 276-1525. There are usual considerations of setting the drive to respond as the drive number you want it to be, and of resistive termination of the drive cable, as with 5¼-inch drives. I recommend using 3½-inch drives under OS-9 with disk modules designed to use all 80 tracks and both sides. Be sure you have one 40-track (preferably double-sided) 5¼-inch drive in the system to allow you to read disks other CoCo users and producers are still using. The 3½-inch drives are fast becoming the industry standard for replaceable media drive systems.

Use of the full capacity of 80-track, double-sided drives via RS-DOS is rather difficult. You can use such drives as single-sided, 35-track drives under RS-DOS, with no modifications to either the operating system or the drives (you'd merely be using the first 35 tracks on Side 0, and ignoring the remaining 80 percent of the drive's capacity). With minor modifications to RS-DOS (such as an ADOS EPROM), you can also use them as 35- or 40-track, double-sided drives.

J&M Controller Fix

• *My J&M JFD-CoCo does not work with my CoCo 3. Can you tell me how to fix it?*

Gil Winograd
(DEMONN)
Glen Ellyn, IL

You need to de-solder U11 (the 74LS04 chip) from the board and replace it with a 7404. The problem is that the gate on it used to supply the SCS line to the controller chip (pins 1 and 2 of the 7404) offers just a shade too much delay, and this causes problems. For those of you who are not hackers equipped to de-solder and replace chips, J&M generously offers to make this repair for $5 plus the cost of two-way shipping of your controller. Contact them for details. J&M has been very conscientious in both working hard to find this problem and offering a fix to the public at a nominal cost. I applaud their efforts.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

The CoCo ROS, Part III:

The Robotics Program and Interfacing

By Dennis H. Weide

Now that you've built and tested the CoCo ROS hardware, it's time to show you how to interface it to the Robotix R-2000 robot kit and present the program that allows you to use it. With the ROS program, you'll be able to write ROS macros to activate robotic-type toys, electric train layouts or even your own robot if you decide to build one.

The ROS System

The ROS program is actually two separate programs. The first is a BASIC program (Listing 1) that allows you to load the machine language program, and to load and save ROS macro files to cassette. It also allows you to clear the ROS file buffer. It's menu-driven and self-explanatory. To use the ROS program, type `CLOAD "ROBOT"` and press ENTER. The program loads and executes the machine language program for you.

The second program (Listing 2) is the machine language program which was originally written in PASCAL. This program is also menu-driven. It allows you to write, edit, test and execute the ROS macro files.

Let's take a look at each command listed on the ROS program menu.

Append — adds lines to an existing ROS macro file. Enter `X` at the instruction prompt to exit the Append mode.

Delete — deletes lines from an existing ROS macro file. To terminate the delete mode, enter zero (`0`) for the line number when prompted.

Edit — changes an existing command in an existing ROS macro file. This is not a true editor. Because of the simplicity of the ROS program, you must retype the entire macro line. Enter a zero for the line number to exit the Edit mode.

Insert — inserts lines in an existing ROS macro file. Enter a zero for the line number to exit the Insert mode.

List — lists ROS macros resident in memory to the screen.

Print — lists ROS macros resident in memory to the printer.

Quit — returns to BASIC. You must load and save ROS macro files from the BASIC program.

Run — executes an ROS macro file.

Test — use this command to test an ROS macro file. Press the space bar for each command in the file. This steps the macro through each command so you can observe its effect.

Write — writes a new ROS macro file. It starts at the beginning of the ROS buffer. Any macro lines in the buffer will be overwritten when the Write command is executed.

ROS Macro File Structure

The ROS macro file is stored in graphics addresses 1536 to 7679. Each ROS macro line requires five bytes of memory. The ROS program encodes macro instructions and stores them in five bytes during the Write function, and decodes and executes them during the Test and Run functions. You can create ROS macros with more than 1,200 commands per file. If you `PCLEAR 8` before loading the BASIC program, you can create macros twice as large.

The five bytes per macro line are used as follows: Instructions are stored in bytes 1 and 2 as an address. The device is stored in Byte 3 as a power of 2, and the duration is stored in bytes 4 and 5 as a decimal value from 0 to 16383.

ROS Commands

There are only five commands available for use in ROS macros. Because the ROSSP is powered from the CoCo, power requirements must be kept to a minimum. Therefore, only one movement can be executed at a time. However, the five commands allow some versatility. The basic command syntax is instruction, device number, duration. The ROS command Forward is used to turn on the specified motor in the forward direction. For example `FORWARD 2 10` turns on Motor 2 for an internal count of 10. Reverse is used to turn on the specified motor in the reverse direction. It is similar in structure to the Forward command. Halt causes macro execution to stop for the specified duration. The device number is not used in this command. Until executes the command following it until the specified device (input) goes low. Example:

```
UNTIL     3
FORWARD   5
```

This example causes Motor 5 to turn forward until Input 3 goes low. Notice that the duration is not used in either of the two commands and, finally, the command Wait stops macro execution until the specified device (input) goes low. This allows the ROS macro to be synchronized with mechanical equipment.

Dennis Weide is a communications technician for AT&T communications in Albuquerque, New Mexico, where he programs AT&T and IBM PCs. He enjoys making toys and teaching computer programming.

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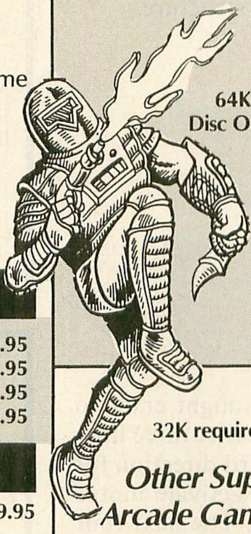

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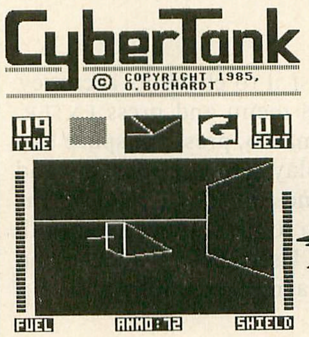

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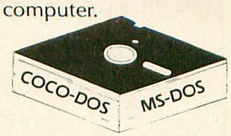

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Writing an ROS Macro

When writing an ROS macro, you're prompted for all the *inputs*. Let's enter a sample macro to see the structure.

You see:	You enter:
INSTRUCTION	FORWARD
DEVICE NUMBER	3
DURATION	12
INSTRUCTION	FORWARD
DEVICE NUMBER	10
DURATION	22
INSTRUCTION	UNTIL
DEVICE NUMBER	1
INSTRUCTION	FORWARD
DEVICE NUMBER	3
INSTRUCTION	X

This example shows the macro lines you might enter to program a robot to do some simple task. The first three lines tell the ROS to activate Motor 3 in the forward direction for a count of 12. The next three lines tell it to activate motor 10 in the reverse direction for a count of 22. The next four lines tell it to activate Motor 3 in the forward direction until Input 1 goes low. The last line tells the ROS to exit the write or append mode. The ROS macro is now in memory and can be tested or saved to cassette.

Testing the Macro

After writing an ROS macro, test it to check its accuracy. Select the T option from the ROS menu and press ENTER. When you're ready to execute the macro, press the space bar. The first macro line will be displayed on the screen and executed. Press ENTER to display and execute each line of the macro. The macro will continue to loop through itself until you press N to end the test mode. Use the Edit, Delete and Insert modes to make necessary macro corrections.

Executing the Macro

Execute the macro by selecting R from the ROS menu and pressing ENTER. This mode automatically executes each

Figure 1: Motor Switch Wiring

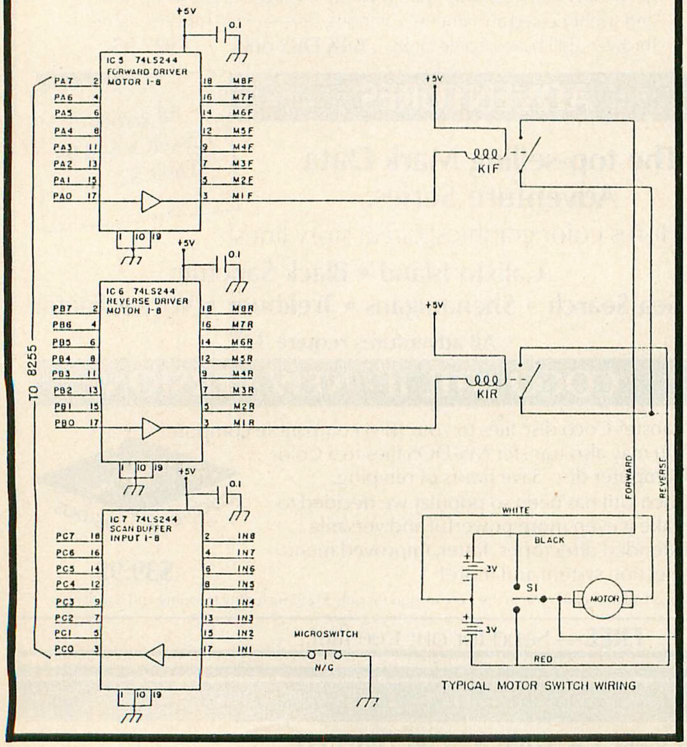
+5V
0.1
IC 5 74LS244 FORWARD DRIVER MOTOR 1-8
PA7 2
PA6 4
PA5 6
PA4 8
PA3 11
PA2 13
PA1 15
PA0 17
18 M8F
16 M7F
14 M6F
12 M5F
9 M4F
7 M3F
5 M2F
3 M1F
1 10 19
IC 6 74LS244 REVERSE DRIVER MOTOR 1-8
PB7 2
PB6 4
PB5 6
PB4 8
PB3 11
PB2 13
PB1 15
PB0 17
18 M8R
16 M7R
14 M6R
12 M5R
9 M4R
7 M3R
5 M2R
3 M1R
TO 8255
KIF
KIR
FORWARD
REVERSE
IC 7 74LS244 SCAN BUFFER INPUT 1-8
PC7 18
PC6 16
PC5 14
PC4 12
PC3 9
PC2 7
PC1 5
PC0 3
2 IN8
4 IN7
6 IN6
8 IN5
11 IN4
13 IN3
15 IN2
17 IN1
MICROSWITCH
N/C
WHITE
BLACK
3V
S1
MOTOR
RED
TYPICAL MOTOR SWITCH WIRING

Figure 2: Robotix Switch Circuit Board

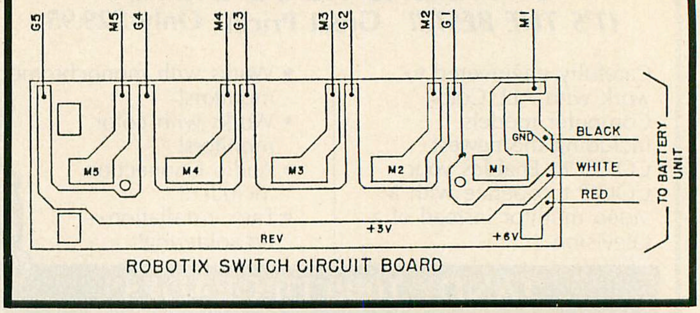
G5
M5
G4
M4
G3
M3
G2
M2
G1
M1
GND
BLACK
WHITE
RED
TO BATTERY UNIT
REV
+3V
+6V
ROBOTIX SWITCH CIRCUIT BOARD

Figure 3: Lead Designations

Lead Name	Definition
A0 - A2	Address lines 0 to 2
CS	Chip select lead
D0 - D7	Data lines 0 to 7 (8 bits)
E	Processor E clock lead
IN1 - IN16	ROS inputs 1 to 16
M1F - M16F	Motor forward leads 1 to 16
M1R - M16R	Motor reverse leads 1 to 16
PA0 - PA7	Port A bits 0 to 7 (output)
PB0 - PB7	Port B bits 0 to 7 (output)
PC0 - PC7	Port C Bits 0 to 7 (input)
RD	Read enable lead
R/D	Processor read/write lead
SCS	Processor chip select lead
WR	Write enable lead

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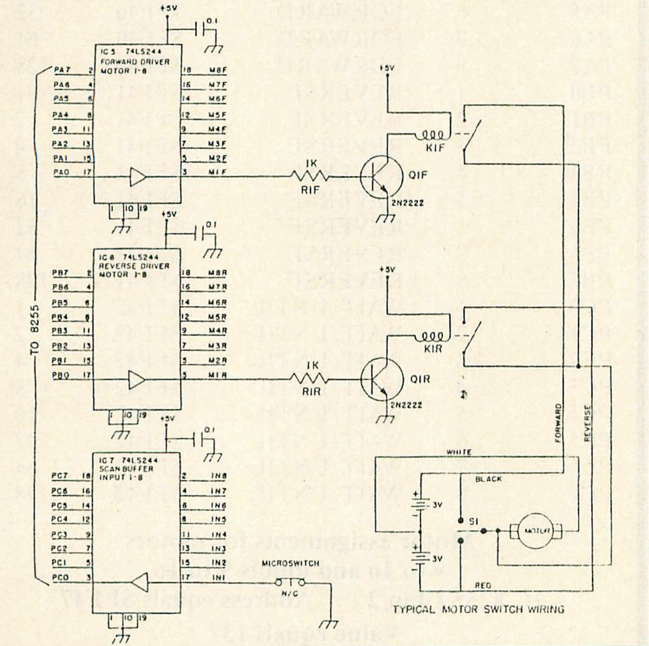
Figure 4: Component Designations

Designation	Definition
IC1 - IC10	Integrated Circuit (chip) 1 to 10
K1F - K16F	Forward control relay 1 to 16
K1R - K16R	Reverse control relay 1 to 16
Q1F - Q16F	Forward control transistor 1 to 16
Q1R - Q16R	Reverse control transistor 1 to 16
R1F - R16F	Forward control resistor 1 to 16
R1R - R16R	Reverse control resistor 1 to 16
S1 - S16	Input switch 1 to 16

Figure 5: Connecting Relay With Low Coil Resistance


+5V
0.1
IC5 74LS244 FORWARD DRIVER MOTOR 1-8
PA7 PA6 PA5 PA4 PA3 PA2 PA1 PA0
M8F M7F M6F M5F M4F M3F M2F M1F
IC6 74LS244 REVERSE DRIVER MOTOR 1-8
PB7 PB6 PB5 PB4 PB3 PB2 PB1 PB0
M8R M7R M6R M5R M4R M3R M2R M1R
IC7 74LS244 SCAN BUFFER INPUT 1-8
PC7 PC6 PC5 PC4 PC3 PC2 PC1 PC0
IN8 IN7 IN6 IN5 IN4 IN3 IN2 IN1
TO 8255
1K
R1F
Q1F
2N2222
K1F
R1R
Q1R
K1R
MICROSWITCH
N/C
FORWARD
REVERSE
WHITE
BLACK
RED
3V
S1
MOTOR
TYPICAL MOTOR SWITCH WIRING

macro instruction without any other input from you. It also loops through the macro until N or the firebutton on either joystick is pressed.

Interfacing the ROS

I connected my ROSSP to a small robot arm I created using the Robotix R-2000 kit from Milton Bradley. Figure 1 shows the schematic representation of the Robotix switch circuit board and how it's wired to the ROSSP. Figure 2 shows the actual circuit board. This board switches between +3 volts and -3 volts to activate forward and reverse movement. Leads M1 through M5 are the battery leads going to the motors. Leads G1 through G5 are the ground leads to the motors. The red lead on the right side of the schematic is the reverse direction lead and the black lead is the forward direction lead. The white lead is ground.

Using a short piece of cable and a connector, wire the M1 through M5 battery and ground leads to the ROSSP relays as shown in figures 3 and 4. Notice that the switch side (S1) of the motor is connected to both the forward relay (K1F) and the reverse relay (K1R). The connector must be unplugged when the ROSSP is inserted in the ROM port and power is applied. Otherwise, the +3 volts and -3 volts will be shorted together. The ROS program will instruct you when to plug in the switch circuit. Figures 3 and 4 explain all the lead and component designations.

Because of the inaccuracy of the motors supplied with the kit, I cut cams of thin plastic and mounted them on the motor

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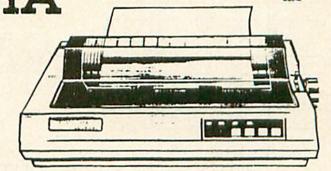

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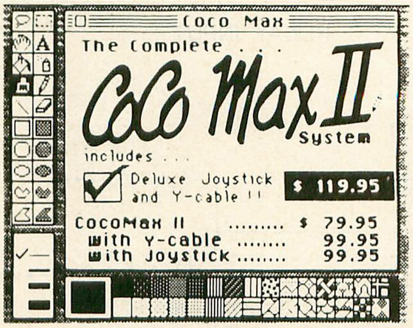

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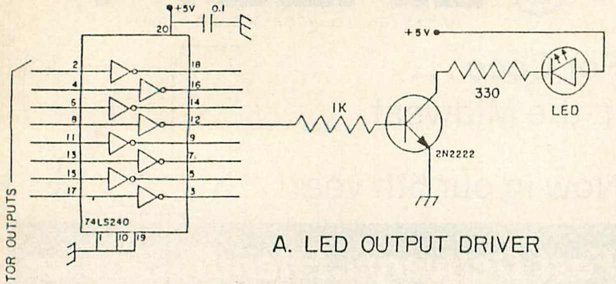
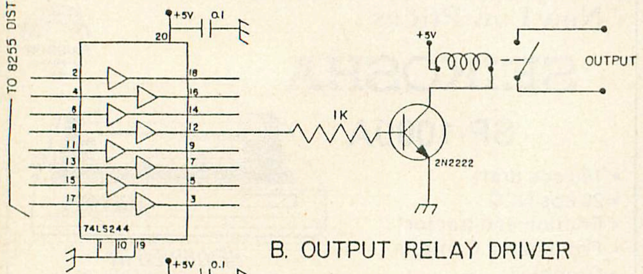
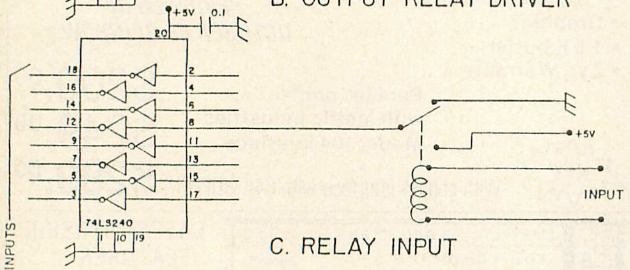
Figure 6: Alternate Input/Output Interfacing Methods



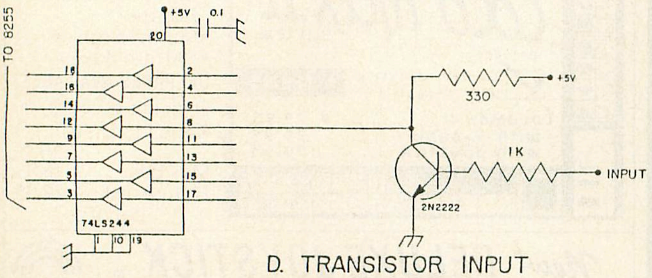
A. LED OUTPUT DRIVER



B. OUTPUT RELAY DRIVER



C. RELAY INPUT



D. TRANSISTOR INPUT

shafts. These cams were used to operate microswitches connected to scan buffer inputs (see Figure 3). Using the Until command, the microswitches provided fairly accurate arm positioning. I was able to move a small plastic box back and forth from one spot to another automatically for several hours.

More Options

The ROSSP circuit can be used in other applications by modifying the circuit. Figure 5 shows an alternative method of connecting relays with a low coil resistance. If you use that type, you will need an external power supply. The transistors Q1F and Q1R act as low current switches. A logic high applied to the base of the transistors causes them to conduct. This places ground at the bottom of the relay winding and the relay operates. Resistors R1F and R1R are current limiting resistors.

Figure 6 shows alternate methods of interfacing inputs and outputs to the ROSSP. With some experimentation, you can connect almost any type of peripheral device you can think of. Figure 7 shows the motor assignments for the 8255 PPI chips, the instruction, addresses and values used to write the ROS program. Using that information, you can write your

Figure 7

Motor assignments for motors
1 to 8 and inputs 1 to 8
IC 8255 Chip 1 Address equals $FF43
Value equals 137

8255 Lead	Motor Number	Instruction	8255 Addr.	Addr. Value
PA0	1	FORWARD	$FF40	1
PA1	2	FORWARD	$FF40	2
PA2	3	FORWARD	$FF40	4
PA3	4	FORWARD	$FF40	8
PA4	5	FORWARD	$FF40	16
PA5	6	FORWARD	$FF40	32
PA6	7	FORWARD	$FF40	64
PA7	8	FORWARD	$FF40	128
PB0	1	REVERSE	$FF41	1
PB1	2	REVERSE	$FF41	2
PB2	3	REVERSE	$FF41	4
PB3	4	REVERSE	$FF41	8
PB4	5	REVERSE	$FF41	16
PB5	6	REVERSE	$FF41	32
PB6	7	REVERSE	$FF41	64
PB7	8	REVERSE	$FF41	128
PC0	1	WAIT/UNTIL	$FF42	1
PC1	2	WAIT/UNTIL	$FF42	2
PC2	3	WAIT/UNTIL	$FF42	4
PC3	4	WAIT/UNTIL	$FF42	8
PC4	5	WAIT/UNTIL	$FF42	16
PC5	6	WAIT/UNTIL	$FF42	32
PC6	7	WAIT/UNTIL	$FF42	64
PC7	8	WAIT/UNTIL	$FF42	128

Motor assignments for motors
9 to 16 and inputs 9 to 16
IC 8255 Chip 2 Address equals $FF47
Value equals 137

8255 Lead	Motor Number	Instruction	8255 Addr.	Addr. Value
PA0	9	FORWARD	$FF44	1
PA1	10	FORWARD	$FF44	2
PA2	11	FORWARD	$FF44	4
PA3	12	FORWARD	$FF44	8
PA4	13	FORWARD	$FF44	16
PA5	14	FORWARD	$FF44	32
PA6	15	FORWARD	$FF44	64
PA7	16	FORWARD	$FF44	128
PB0	9	REVERSE	$FF45	1
PB1	10	REVERSE	$FF45	2
PB2	11	REVERSE	$FF45	4
PB3	12	REVERSE	$FF45	8
PB4	13	REVERSE	$FF45	16
PB5	14	REVERSE	$FF45	32
PB6	15	REVERSE	$FF45	64
PB7	16	REVERSE	$FF45	128
PC0	9	WAIT/UNTIL	$FF46	1
PC1	10	WAIT/UNTIL	$FF46	2
PC2	11	WAIT/UNTIL	$FF46	4
PC3	12	WAIT/UNTIL	$FF46	8
PC4	13	WAIT/UNTIL	$FF46	16
PC5	14	WAIT/UNTIL	$FF46	32
PC6	15	WAIT/UNTIL	$FF46	64
PC7	16	WAIT/UNTIL	$FF46	128

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Color Disk Manager will do selective initializations, verifies, backups, repairs and much more!

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- allows you to make a backup of the directory out of reach of basic and put it back if a directory crash occurs; has a recover file command which will load entire files off the disk if the directory crashes and the allocation table is good; will repair or salvage crashed disk several ways
- is 64K compatible allowing a 64K backup; does backups by track, a range of tracks, or the whole disk (will do more than 35 tracks)
- gives an allocation table map with granules x-referenced to tracks and sectors, and showing which granules are used; displays a file granule map showing which granules, tracks, and sectors the file uses, and the length
- will do a directory displaying file names in two columns, the number of free granules, and the free bytes if below 65535; has a kill file command
- loads and saves, sectors, tracks or files; loads files two ways, as done by basic, or with header bytes left in, which helps in studying how files are saved on disk; has an append sector command
- verifies tracks or the entire disk showing the track and sector if an error occurs, with the option of continue or stop
- is multiple drive compatible
- allows you to save a block of memory to disk; transfers programs from tape to disk
- has a rapid scan feature which allows you to scan the disk by tracks and sectors using the arrow keys
- will dump memory to the screen in ascii, good for listing basic programs or source files; has a move memory block command, and a transfer control command
- converts decimal to hex or hex to decimal
- allows you to examine memory using the arrow keys with displays in hex (or decimal) and ascii
- will load and execute rompac's saved on disk; has a move rom to ram command
- allows you to change origin (start addr.) of ML programs; displays the start, end, and execute addresses of ML programs
- **32K - 64K ECB $34.95 Disk**

RAINBOW SCREEN MACHINE

- Add these features to your computer/program: ML extension of Basic loads on top of 16, 32, or 64K machines to enable easy mixture of **hi-res graphics and text** in your programs. Dense text or large lettering for children, visually impaired or VCR title screens with no programming!
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- Simple 2-letter abbreviated commands inside your program or **control key** entry from keyboard, even during program execution!
- Includes demo program, **character generator** program and manual. 16K Basic required — 32K recommended. **$29.95 Tape; $32.95 Disk.**

COLOR TAPE MANAGER

- merges multiple basic programs into one; appends multiple machine language programs into one; appends machine language to basic (example included)
- converts numbers from hex to decimal or decimal to hex; allows input in hex or decimal
- rapidly scans memory using the arrow keys with auto-key repeat
- displays memory in hex (or decimal) and ascii; allows the changing of memory in decimal or hex
- deals with missing end of file blocks; loads and saves data with or without a filename block
- handles programs with varying block lengths
- displays the start, end, and execute addresses of ML programs; displays the buffer start, end and top addresses
- converts ML programs into basic data statements which can be loaded as, or merged with, a basic program
- turns the audio and cassette motor on and off with one key commands; has inverted displays which lessen eye fatigue
- finds the end of programs on tape even from within a program with a skip file command; allows the transferring of control to other programs with a go command
- moves blocks of memory from start through end address to new start address; allows the changing of the origin (start adds) or ML programs
- has an 8,380 byte loading buffer with 16K systems and 24,760 byte loading buffer with 32K systems
- **16K ECB mimimum $19.95 Tape $22.95 Disk**

SUPER SCREEN MACHINE

All of the features of Screen Machine and more:

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- **Superpatch + command** for instant compatibility with the Superpatch + Editor- Assembler.
- True **Break key** disable and recognition.
- 10 User Definable commands used to activate your special drivers or subroutine.
- Dynamic **Screen Dump command** for use with Custom Software, Engineering's Graphic Screen Print program for simple printer "Snapshots" of your screen even during program execution!
- Super Screen Machine - **$44.95 Tape; $47.95 Disk.**

Screen Machine can be used in games, word processors, utilities, etc. In addition, the custom graphics characters can be used to develop easy, effective hi-res character-graphics programs. The potential is truly unlimited.

Screen Machine is fully interfaced with all keys and commands. Although some Basic programming knowledge is recommended just a few minutes spent studying and referencing your computer's Basic manuals will turn you on to the power of computing with Screen Machine.

Screen Machine can be used to directly create video recorder title screens or large lettering for children or the visually impaired simply by typing.

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Distributors, Ltd., P.O. Box 11932, Edmonton, Alberta T5J-3L1, (403) 421-8003.

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own ROS program. By using a combination of inverting and non-inverting buffers for inputs and outputs, you can turn on or off any electrical device using digital signals.

Optoelectric devices such as infrared detectors and source-detector LEDs could replace microswitches as position detectors. If signal polarity is a problem on the scan buffer inputs, replace the 74LS244s with 74LS240s to invert the input signal. Likewise, by replacing the 74LS240s on the distributor outputs with 74LS244s, the motors would operate until the bit for that motor was set high. Be careful not to operate the forward and reverse relays at the same time if they are used as shown in the schematic. That would short the +3 volts to the -3 volts and could lead to disaster.

I hope this information has been of interest to you. It's only a starting point for those really interested in experimenting with computers. The CoCo offers such easy interfacing to peripheral equipment it's a shame more people aren't taking advantage of it. Using a circuit similar to the ROSSP, we've used the CoCo for everything from a simple robot CPU to a complex industrial security system. Why not try your engineering ability at designing CoCo projects for interfacing?

As always, if you have any questions or comments, feel free to write to me at 14201 Marquette N.E., Albuquerque, NM 87123. Please include a self-addressed, stamped envelope if you would like a reply. □

Listing 1: ROBOT

```
100 '        ROBOT BASIC PROGRAM
200 '        BY DENNIS H. WEIDE
300 '        (C) 1986
400 '
500 '
600 POKE&HFF43,137:POKE&HFF47,13
7
700 POKE&HFF40,0:POKE&HFF41,0:PO
KE&HFF44,0:POKE&HFF45,0
800 FOR X=1 TO 1000:NEXT
900 CLS:PRINT:PRINTTAB(3)"ACTIVA
TE ROBOT CONTROL NOW"
1000 PCLEAR4:PCLS:CLEAR200,19999
:CLOADM
1100 CLS
1200 PRINT:PRINT:PRINTTAB(7)"ROB
OT PROGRAM MENU"
1300 PRINT
1400 PRINTTAB(5)"1. ACCESS ROBOT
 PROGRAM"
1500 PRINTTAB(5)"2. LOAD ROBOT F
ILE"
1600 PRINTTAB(5)"3. SAVE ROBOT F
ILE"
1700 PRINTTAB(5)"4. CLEAR ROBOT
MEMORY"
1800 PRINTTAB(5)"5. END PROGRAM
SESSION"
1900 PRINT:INPUT"  ENTER ONE OF
THE ABOVE >";OA
2000 IF OA<1 OR OA>5 THEN SOUND
100,10:GOTO1100
2100 ON OA GOSUB 2300,2400,2700,
3100,3200
2200 GOTO 1100
2300 EXEC:RETURN
2400 CLS:PRINT:PRINT:INPUT"FILEN
AME>";P$
2500 CLOADM P$
2600 RETURN
2700 CLS:PRINT:PRINT:INPUT"FILEN
AME>";P$
2800 PRINT:INPUT"PREPARE CASSETT
E TO SAVE";L
2900 CSAVEM P$,1536,7679,20000
3000 RETURN
3100 PCLS:RETURN
3200 CLS:END
```

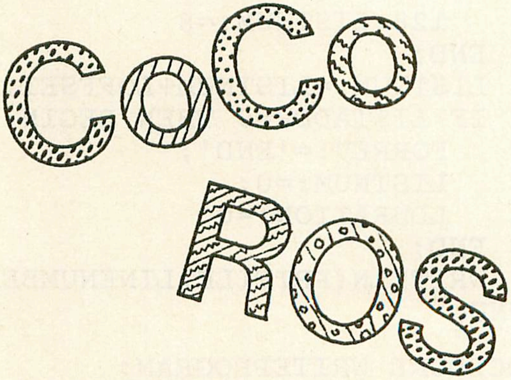
Listing 2: RBT22SRC

```
(**            ROBOT22/SRC              **)
(**          ROBOTICS PROGRAM           **)
(**         BY DENNIS H. WEIDE          **)
(** A ROBOT PROGRAMMING LANGUAGE **)

PROGRAM ROBOT(INPUT,OUTPUT);

VAR
CHOICE,KEY,OFFSET,LOFFSET,LINENUMBER,LISTADDR,WRITEADDR,VALUE,LVALUE,LDU
RATION,DURATION,LISTNUM,MOTORNUM,POINTER:INTEGER;
    LASTCHAR,DIRECTION:CHAR;
    PRTFILE:TEXT;

PROCEDURE WRITEPROG1;
  BEGIN
    WRITE('INSTRUCTION >');
    READLN(DIRECTION);
    CASE DIRECTION OF
    'H':OFFSET:=8;
    'F':OFFSET:=0;
    'R':OFFSET:=1;
    'U':OFFSET:=9;
    'W':OFFSET:=2;
    'X':EXIT
    ELSE WRITELN('INSTRUCTION ERROR')
  END;
  IF DIRECTION<>'H' THEN BEGIN
    WRITE('DEVICE NUMBER> ');
    READLN(MOTORNUM);
  END
  ELSE VALUE:=0;
  IF MOTORNUM<9 THEN BEGIN
    WRITEADDR:=$FF40;
  END;
  IF MOTORNUM>8 THEN BEGIN
    WRITEADDR:=$FF44;
  END;
  CASE MOTORNUM OF
    1,9:VALUE:=1;
    2,10:VALUE:=2;
    3,11:VALUE:=4;
    4,12:VALUE:=8;
    5,13:VALUE:=16;
    6,14:VALUE:=32;
    7,15:VALUE:=64;
    8,16:VALUE:=128
  END;
  IF (DIRECTION<'U') AND (LASTCHAR<>'U') THEN BEGIN
    WRITE('DURATION> ');
    READLN(DURATION);
    IF DURATION>16383 THEN BEGIN
      WRITE('DURATION ERROR')
    END;
  END
    ELSE DURATION:=0;
    LASTCHAR:=DIRECTION;
    WORD[POINTER+LINENUMBER]:=WRITEADDR+OFFSET;
    BYTE[POINTER+LINENUMBER+2]:=VALUE;
    WORD[POINTER+LINENUMBER+3]:=DURATION;
  END;
PROCEDURE LISTPROG1;
VAR FORREV:STRING;
  BEGIN
    LISTADDR:=WORD[POINTER+LINENUMBER];
    LVALUE:=BYTE[POINTER+LINENUMBER+2];
    LDURATION:=WORD[POINTER+LINENUMBER+3];
    LOFFSET:=0;
    IF LISTADDR>$FF42 THEN LOFFSET:=8;
    IF LISTADDR=$FF49 THEN LOFFSET:=0;
    CASE LISTADDR OF
      $FF40,$FF44:FORREV:='FORWARD';
      $FF41,$FF45:FORREV:='REVERSE';
      $FF42,$FF46:FORREV:='WAIT';
      $FF48,$FF4C:FORREV:='HALT';
      $FF49,$FF4D:FORREV:='UNTIL'
    END;
```



```
      CASE LVALUE OF
        0:LISTNUM:=-8;
        1:LISTNUM:=1;
        2:LISTNUM:=2;
        4:LISTNUM:=3;
        8:LISTNUM:=4;
        16:LISTNUM:=5;
        32:LISTNUM:=6;
        64:LISTNUM:=7;
        128:LISTNUM:=8
      END;
      LISTNUM:=LISTNUM+LOFFSET;
      IF LISTADDR=0 THEN BEGIN
        FORREV:='END';
        LISTNUM:=0;
        LDURATION:=0
      END;
      WRITELN(PRTFILE,LINENUMBER:4,'    ',FORREV:8,LISTNUM:2,LDURATION:6);
    END;

  PROCEDURE WRITEPROGRAM;
   BEGIN
     PAGE;
     WRITELN;
     DIRECTION:='A';
     LINENUMBER:=5;
     WRITELN('POINTER =',POINTER:5);
     WHILE DIRECTION<'X' DO BEGIN
       WRITEPROG1;
     WORD[POINTER]:=LINENUMBER;
     LINENUMBER:=LINENUMBER+5;
```

Corrections

"Graphically Speaking: The Artistic BBS" (November 1986, Page 108): Eric Bailey has written us to correct the error-trapping routine for the load function in *LWRSEDIT.* Lines 430, 460 and 470 need to be changed as below.

```
430 GOSUB 730:PRINT@0,"";:FF$=F$
:IF FF$="" THEN GOTO340
460 FF$=FF$+"/DAT"
470 OPEN "D",#1,FF$:E=LOF(1):CLO
SE#1:IF E=0 THEN PRINT"FILE NOT
FOUND":CLOSE#1:KILL FF$:FOR T=1
TO 1000:NEXTT:GOSUB 780:GOTO430
```

"Pretty Pictures on the CoCo 3 With *CC3 Draw*" (Review, December 1986, Page 148): In the review of *CC3 Draw*, we incorrectly reported Spectrum Projects as being in Florida. Spectrum is located in the state of New York.

"A PAL for Your CoCo 3" (January 1987, Page 98): Contrary to speculation in the article, Radio Shack *does not* offer a free upgrade of the Multi-Pak Interface, regardless of date of purchase or whether the warranty is still in effect. There is a charge for this service.

"Festive CoCo: Ready to PAINT the Town" (July 1986, Page 46), "PUT Speedy GETzales to Work" (November 1986, Page 158): H. Allen Curtis has written to describe a problem with running his programs from RAINBOW ON TAPE. It appears that, in the process of compiling RAINBOW ON TAPE, two extra bytes are added to the end of the files. This interferes with the embedded machine language Mr. Curtis uses in some of his programs. To correct the problem, merely load each program, replace `POKE 337,26` in Line 2 with `POKE 337,24` and resave the program.

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type `DATA` at the CoCo SIG prompt and `INFO` at the Topic? prompt.

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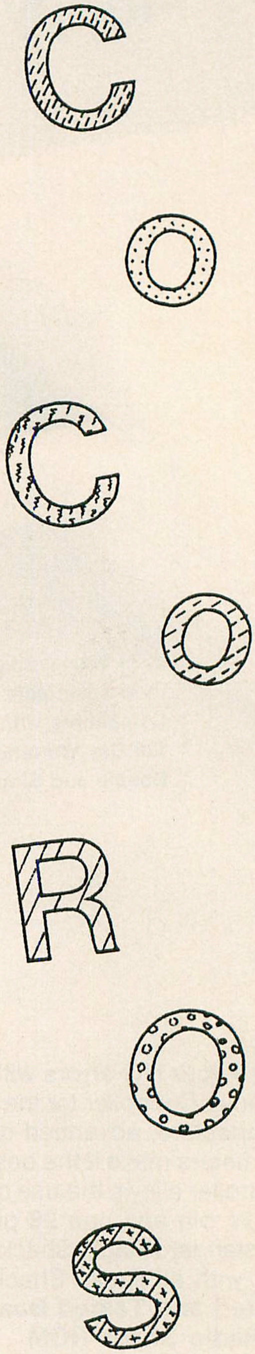
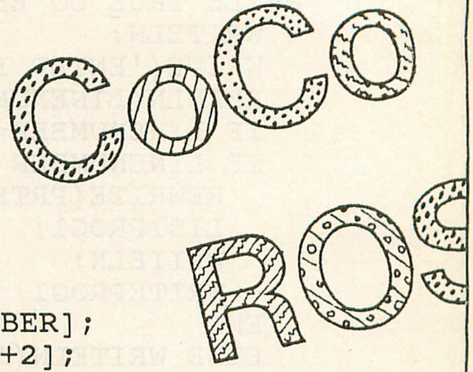
```
    END;
  END;


PROCEDURE LISTPROGRAM;
  BEGIN
    PAGE;
    CASE DIRECTION OF
      'P':REWRITE(PRTFILE,':-2');
      'L':REWRITE(PRTFILE,':-3')
    END;
    LINENUMBER:=5;
    LISTADDR:=1;
    WRITELN;
    REPEAT
      LISTPROG1;
      LINENUMBER:=LINENUMBER+5;
    UNTIL LISTADDR=0;
    WRITELN;
    REWRITE(PRTFILE,':-3');
    WRITE('   PRESS <ENTER> TO CONTINUE');
    REPEAT KEY:=CALL(41419,0) UNTIL KEY<>0;
  END;


PROCEDURE RUNPROGRAM;
  BEGIN
    PAGE;
    WHILE TRUE DO BEGIN
      LINENUMBER:=5;
      FOR KEY:=1 TO 2000 DO BEGIN
        VALUE:=0;
      END;
      REPEAT
        IF DIRECTION='T' THEN BEGIN
          REPEAT KEY:=CALL(41419,0) UNTIL KEY<>0
        END;
        CHOICE:=BYTE[65280];
        CASE CHOICE OF
          125,126,253,254:EXIT
        END;
        MOTORNUM:=WORD[POINTER+LINENUMBER];
        VALUE:=BYTE[POINTER+LINENUMBER+2];
        DURATION:=WORD[POINTER+LINENUMBER+3];
        LISTPROG1;
        CASE MOTORNUM OF
          $FF40,$FF41,$FF44,$FF45:BEGIN
            BYTE[MOTORNUM]:=VALUE;
            REPEAT
              FOR KEY:=1 TO 1000 DO BEGIN
                CHOICE:=0;
              END;
              DURATION:=PRED(DURATION);
            UNTIL DURATION=0;
          END;
          $FF42,$FF46:BEGIN
            REPEAT
              DURATION:=BYTE[MOTORNUM] AND VALUE;
```



```
        UNTIL DURATION=VALUE;
      END;
      $FF48,$FF4C:BEGIN
        REPEAT
          FOR KEY:=1 TO 1000 DO BEGIN
            CHOICE:=0;
          END;
          DURATION:=PRED(DURATION);
        UNTIL DURATION=0;
      END;
      $FF49,$FF4D:BEGIN
        WRITEADDR:=MOTORNUM-7;
        OFFSET:=VALUE;
        LINENUMBER:=LINENUMBER+5;
        LISTPROG1;
        MOTORNUM:=WORD[POINTER+LINENUMBER];
        VALUE:=BYTE[POINTER+LINENUMBER+2];
        BYTE[MOTORNUM]:=VALUE;
        REPEAT
          DURATION:=BYTE[WRITEADDR] AND OFFSET;
        UNTIL DURATION=OFFSET;
        BYTE[MOTORNUM]:=0;
      END
    END;
    BYTE[MOTORNUM]:=0;
    LINENUMBER:=LINENUMBER+5;
  UNTIL MOTORNUM=0;
END;
```



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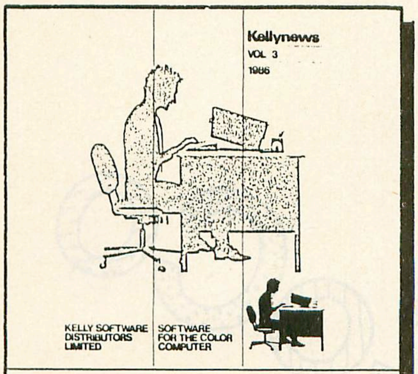
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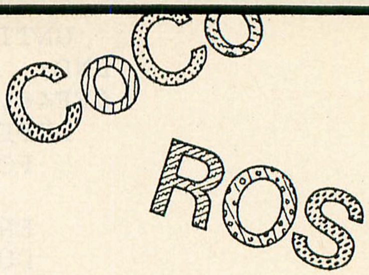
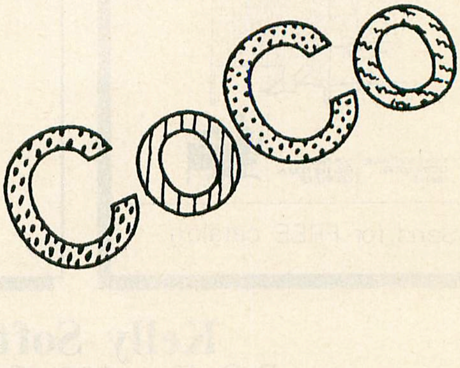
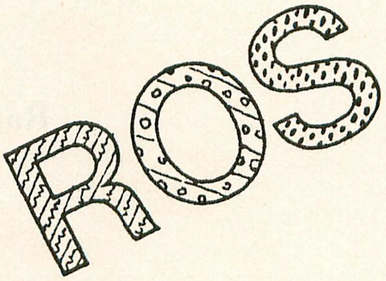
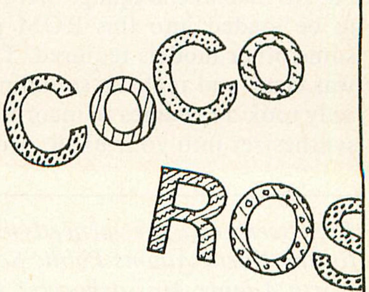


```
  END;

PROCEDURE EDITLINE;
  BEGIN
    PAGE;
    WHILE TRUE DO BEGIN
      WRITELN;
      WRITE('ENTER LINE NUMBER TO EDIT >');
      READLN(LINENUMBER);
      IF LINENUMBER=0 THEN EXIT;
      IF LINENUMBER MOD 5=0 THEN BEGIN
        REWRITE(PRTFILE,':-3');
        LISTPROG1;
        WRITELN;
        WRITEPROG1
      END
      ELSE WRITELN('      INVALID LINE NUMBER');
    END;
  END;
PROCEDURE DELETELINE;
  BEGIN
    PAGE;
    WHILE TRUE DO BEGIN
      WRITELN;
      WRITE('ENTER LINE NUMBER TO DELETE >');
      READLN(LINENUMBER);
      IF LINENUMBER=0 THEN EXIT;
      IF LINENUMBER MOD 5=0 THEN BEGIN
        WORD[POINTER]:=WORD[POINTER]-5;
        REWRITE(PRTFILE,':-3');
        LISTPROG1;
        REPEAT
          WORD[POINTER+LINENUMBER]:=WORD[POINTER+LINENUMBER+5];
          BYTE[POINTER+LINENUMBER+2]:=BYTE[POINTER+LINENUMBER+7];
          WORD[POINTER+LINENUMBER+3]:=WORD[POINTER+LINENUMBER+8];
          LINENUMBER:=LINENUMBER+5;
        UNTIL WORD[POINTER+LINENUMBER]=0;
      END;
    END;
  END;


PROCEDURE APPENDPROGRAM;
  BEGIN
    LINENUMBER:=WORD[POINTER];
    PAGE;
    DIRECTION:='A';
    WHILE DIRECTION<'X' DO BEGIN
      WRITEPROG1;
      WORD[POINTER]:=LINENUMBER;
      LINENUMBER:=LINENUMBER+5;
    END;
  END;


PROCEDURE INSERTLINE;
VAR NEWLINE:INTEGER;
  BEGIN
```



```
  PAGE;
  LINENUMBER:=WORD[POINTER];
  WORD[POINTER]:=LINENUMBER+5;
  WRITELN;
  WRITE('ENTER LINE TO INSERT >');
  READLN(NEWLINE);
  IF NEWLINE>LINENUMBER THEN EXIT;
  IF NEWLINE MOD 5=0 THEN BEGIN
    REPEAT
      WORD[POINTER+LINENUMBER]:=WORD[POINTER+LINENUMBER-5];
      BYTE[POINTER+LINENUMBER+2]:=BYTE[POINTER+LINENUMBER-3];
      WORD[POINTER+LINENUMBER+3]:=WORD[POINTER+LINENUMBER-2];
      LINENUMBER:=LINENUMBER-5;
    UNTIL LINENUMBER=NEWLINE;
      WRITEPROG1;
    END;
  END;


BEGIN
  PAGE;
  BYTE[150]:=1;
  DIRECTION:='A';
  POINTER:=WORD[186]+1;
  WRITELN('POINTER=',POINTER:5);
  WRITELN;
  REWRITE(PRTFILE,':-3');
  LINENUMBER:=5;
  WHILE TRUE DO BEGIN
    PAGE;
    WRITELN('        ROBOTICS PROGRAM');
    WRITELN;
    WRITELN('    A - APPEND MACRO LINES');
    WRITELN('    D - DELETE MACRO LINE');
    WRITELN('    E - EDIT MACRO LINE');
    WRITELN('    I - INSERT MACRO LINES');
    WRITELN('    L - LIST ROBOT MACRO');
    WRITELN('    P - PRINT ROBOT MACRO');
    WRITELN('    Q - QUIT TO BASIC');
    WRITELN('    R - RUN ROBOT MACRO');
    WRITELN('    T - TEST ROBOT MACRO');
    WRITELN('    W - WRITE ROBOT MACRO');
    WRITELN;
    WRITE('        ENTER CHOICE >');
    READLN(DIRECTION);
    CASE DIRECTION OF
      'A':APPENDPROGRAM;
      'D':DELETELINE;
      'E':EDITLINE;
      'I':INSERTLINE;
      'L','P':LISTPROGRAM;
      'Q':EXIT;
      'R','T':RUNPROGRAM;
      'W':WRITEPROGRAM
      ELSE WRITE('         INVALID SELECTION')
    END;
  END;
END.
```





A Spelling Program That Speaks for Itself

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget that this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Approximately two years ago, Tandy introduced the Speech/Sound Pak for its Color Computer line. While several other models were already on the market, some at a considerably lower price, Tandy released this little wonder that was capable of working as a free-standing add-on. No machine language driver needed to be loaded into this ROM pack, as some other models required. The voice was clear and realistic sounding and it only took a few lines to incorporate the synthesizer into your BASIC programs.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

The Speech/Sound Pak still remains part of the Tandy catalog, while some other earlier, independent models are now hard to find. One void still remains, however. Owners of this Pak still do not have enough software to meet their needs or appetites. Therefore, at the suggestion of Mr. Don Andreatta of Houston, Texas, this month's "Wishing Well" returns to the field of artificial voice synthesis by introducing a new program, *Hear It and Spell It*.

Why a Talking Speller?

When I began learning BASIC programming after buying my first CoCo, a number of programs were provided as standard introductions to the world of programming. One was, "Let's design a program that simulates the rolling of dice!" Another hot ticket was a simple "yes/no" or "true/false" format for tests. The third biggest item covered in training books was usually some kind of spelling test. I combed through these books trying to find anything I could use in my classroom, especially a decent spelling program.

There was usually one problem with all of these simple BASIC programs: None of them was really very effective for drilling or quizzing in spelling. The main reason for this shortcoming is the fact that there is no effective or realistic way to portray the word to be spelled without actually displaying it on the screen. There have been many noble attempts, however.

Some programmers have written variations on the TV game shows, *Password* or *Wheel of Fortune*. There have been other efforts such as Hangman or *Tri-Planetary Hangmenoids* (from an earlier "Wishing Well"), which involve a hit or miss approach to guessing what word has been selected by the computer. Since in spelling we are trying to arrive at the correct letter-for-letter version of a word, a hit or miss approach is not the best idea.

There is really only one way to correctly teach, drill and quiz spelling. That technique is to have the word pronounced to the person trying to spell it. That is the way teachers have done it for centuries. The advent of microcomputers is no reason to abandon a successful method. Instead, the improvement of artificial speech in home microcomputers has given us a better reason to adapt this new technology to the old technique, rather than vice versa.

That brings us to this month's talking program: *Hear It and Spell It*. Designed with these thoughts in mind, `H&SPELL` (its BASIC filename) offers home users a

> "Your CoCo greets you with each new word and recites it twice before asking you how to spell it."

catchy update of the old spelling bee. Granted, many users may have already come up with their own talking spellers upon purchasing the Tandy synthesizer. However, I have attempted to make the program as classy and simple as possible, while still retaining the flavor and feel of our usual "Wishing Well" offerings.

The Program

`H&SPELL` will fit in a standard 16K CoCo with Extended Color BASIC. (It may also work on a 16K Color BASIC machine, but I no longer have one to try it on. All my machines were upgraded long ago. Sorry, all you MC-10 users!) As you start to type in the listing, you will notice that between lines 9 and 10 there appears to be a strange space without a line number. To get this effect, when typing in Line 9, simply advance the space bar until the line appears exactly as shown on the 32-column listing in the magazine. You may then type in the string of '*'s for our border.

The title card is made from our *Titlemaker* from several issues ago. Every month I get letters from readers who say they get an OD Error when running one of these listings they have typed in. Once again, let me remind you that the `DATA` statements at the beginning of the listing must be typed in exactly as you see them. Leaving out so much as a comma will cause the program to choke. Therefore, please be precise when typing in the program.

One of the first subroutines in the program consists of the actual lines suggested by the instruction manual that comes with the Speech/Sound Pak, with a few minor changes. Many of the instructions needed to run the program will also be spoken by your CoCo as the program begins. Remarks such as, "Press ENTER to continue" are actually spoken. Anytime a phrase needs to be spoken, it is given the value of A$ and sent to the subroutine that activates the `SPEECH (GOSUB 105)`.

One thing you will notice is that all my speech strings (A$) are written out phonetically. For example, my last name, Scerbo, is written as Skerbo. While the Pak is usually very accurate

One-Liner Contest Winner . . .

Here are two related one-liners from the same gentleman. *Asclist* (Listing 1) lists an ASCII file from disk to your screen. *Hexlist* (Listing 2) performs the same task, except that output will be in hexadecimal form. A simple edit here and there will cause the output to go to your printer.

Listing 1:

```
1 LINEINPUT"FILENAME:";R$:OPEN"I
",#1,R$:CLOSE:OPEN"D",#1,R$,1:FI
ELD#1,1AS A$:FORX=1TOLOF(1):GET#
1:PRINTA$;:NEXTX:CLOSE:END
```

Listing 2:

```
1 LINEINPUT"FILENAME:";R$:OPEN"I
",#1,R$:CLOSE:OPEN"D",#1,R$,1:FI
ELD#1,1AS A$:FORX=1TOLOF(1):B$="
[  ]":GET#1:MID$(B$,2)=HEX$(ASC(
A$)):PRINTB$;:NEXTX:CLOSE:END
```

Byron Walton
Calgary, Alberta

(For these winning one-liner contest entries, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

NEW

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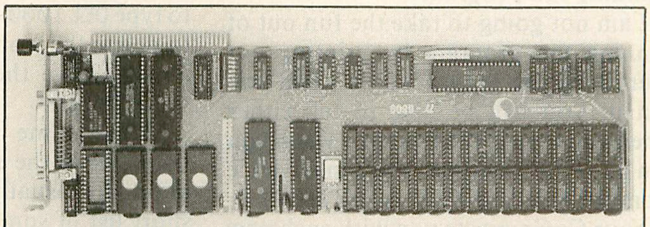

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in pronouncing a string you give it, there are just some combinations it cannot get. That is why for each word we want to have spoken and then spelled, we must supply the correct spelling first, followed by the correct pronunciation.

The words we want to try in our spelling drill will be included starting in Line 1000. The correct entry for putting in your own words is:

```
1000 DATA SPELLING,
PRONUNCIATION
```

with the last line being:

```
5000 DATA END,END
```

The program is designed to handle 40 spelling words (41 counting the `END` statement that is our flag to stop reading data). If you want to increase the number of words, increase the value of `SW` in Line 70 to be one more than the number you want. (If you want 100, then `SW=101`.)

Be sure to save the program before trying to run it. A mistake in the `POKE` statements at the front of the listing could lock up the machine and cause you to lose your whole program. Therefore, save it first.

Running the Program

I am not going to take the fun out of running the program by printing out everything the program says when you run it. You will be able to tell either when you type in the listing or when you run it for the first time. You can advance from the titlecard by pressing ENTER.

Your CoCo greets you with each new word and recites it twice before asking you how to spell it. A set of '*'s corresponding to the number of letters in the word appears. You will also notice that the set of color borders on the screen changes with each new word. An arrow flashes below the letter to be attempted.

If at any time you want to hear the word again, just press the space bar to have it pronounced again. As you select each letter to try, your CoCo will say the letter. If you are not correct, it will say, "No, not J" or whatever letter it is you pressed. Be sure not to type the letters in too quickly, or you may get ahead of the program. There is sometimes some delay when calling the sound subroutine, so typing too fast can mess you up if you make a mistake.

Once the word is correctly spelled, it is repeated and the program spells the word out loud while flashing each letter. This serves as a good reinforcer of the actual spelling because the user sees and hears the words spelled right on the screen.

As with all my programs, pressing @ gives you the score card. You may press Y to rerun, N to stop or C to continue with the word you were working on. Any error in the spelling of a word will count the whole word as wrong. (Sorry, but that's the way it is with real spelling tests, too.)

The order of the words will be different each time you run the program. Remember, putting in too many words will make the program an absolute torture for any child to use. (Would you want to sit and spell 100 words on the computer? Keep it simple.)

Try Some Other Words

You will notice I only included 10 words in the sample listing. Here are a few more suggestions you can try in place of the ones in the listing. Be sure to type `DEL1000-4999` and press ENTER to delete the words in this listing if you already have the program saved with these words.

While some words may be listed twice, since the spelling and pronunciation are usually the same, here is a short list of some that do require phonetic changes:

```
1000 DATA CHILDREN,CHILL DREN
1010 DATA TOMORROW,TO MORROW
1020 DATA NINETEEN,NI NTEEN
1030 DATA BREAKFAST,BREKFAST
1040 DATA FEBRUARY,FEBUARY
1050 DATA WEATHER,WETHER
1060 DATA ONIONS,UNYUNS
1070 DATA SWEATER,SWETTER
1080 DATA HEALTH,HELTH
1090 DATA AMERICA,AHMEHRIKA
5000 DATA END,END
```

You can get the proper rhythm in the pronunciation by adding spaces as needed in the spelling. If you would like to see some good examples of the need to use phonics in the pronunciation, try the spelling words for these states:

```
1000 DATA MINNESOTA,MIN EH
SO TA
1010 DATA ILLINOIS,ILLINOI
1020 DATA PENNSYLVANIA,
PENNSYLVANE E AH
1030 DATA CONNECTICUT,
CONNETTICUT
1040 DATA HAWAII,HA WHYEE
1050 DATA IDAHO,I DAHO
1060 DATA MISSISSIPPI,
MISSISSIPPEE
1070 DATA GEORGIA,GORGIA
1080 DATA OHIO,O HI O
1090 DATA UTAH,U TAHW
5000 DATA END,END
```

Some of the states actually work out OK, but these can be a real pain. If you need to check the correct pronunciation of a word as you are typing in the list, run the program with some words in it and press BREAK. Take the spelling you would like to use for pronunciation and make it equal to `A$`, such as:

```
A$="BAHLONEY"
```

Press ENTER and then type in:

```
GOSUB105
```

Then press ENTER again. If you didn't quite hear it, then `GOSUB105` again. You can repeat this process until you get the sound right. Then type it into the `DATA` line as needed. Remember, always put the correct spelling first and the pronunciation second. Last of all, always remember to include Line 5000 `DATA END,END` to make the program work.

Conclusion

Next month, we will try another new approach to your ideas, maybe even with artificial sound again. Let me know how well this program works for you, and keep your suggestions coming. ☐

40	145
135	225
235	210
335	178
410	79
END	99

The Listing: H&SPELL

```
1 REM****************************
2 REM*  HEAR IT AND SPELL IT    *
3 REM*     BY FRED B.SCERBO     *
4 REM*    COPYRIGHT (C) 1986    *
5 REM*60 HARDING AV.N.ADAMS,MA*
6 REM****************************
```

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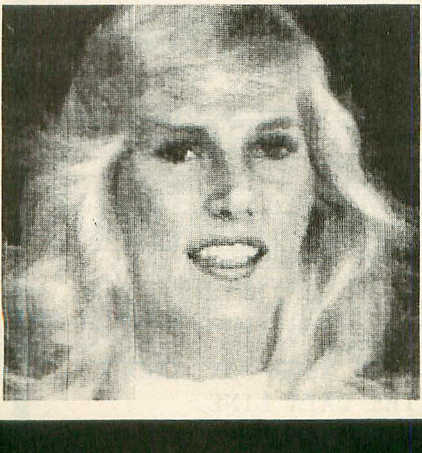
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```
7 REM* THIS PROGRAM WILL NOT   *
8 REM* WORK WITHOUT A SPEECH   *
9 REM*SOUND-PAK BY RADIO SHACK*
  REM**************************
10 CLS0:CLEAR2000:PRINTSTRING$(3
2,252);:FORI=1TO320:READA:PRINTC
HR$(A+128);:NEXT
15 DATA60,58,48,62,56,61,60,60,5
8,53,60,60,58,52,62,60,60,58,,84
,94,85,92,93,92,93,80,16,19,27,1
8,
20 DATA,59,51,58,,53,51,50,48,53
,51,51,58,,59,51,51,58,,80,90,,,
85,,,,17,27,19,19,
25 DATA,58,,58,,53,,,48,53,,,58,
,58,53,50,,,80,90,,,85,,,,21,16,
16,16,
30 DATA51,58,,59,50,55,51,51,58,
55,,,59,49,58,,61,51,48,81,91,,,
87,82,,,20,28,29,28,24
35 DATA99,99,99,99,98,99,99,99,9
9,98,99,99,99,99,99,98,99,98,,,9
9,98,,,35,34,35,35,35,35,35,34
40 DATA106,,,96,104,101,,,,106,1
01,96,,,,104,101,,,,101,,,,37,,4
0,,37,,,40
45 DATA106,,,,,101,,,,106,101,,,
,,,101,,,,101,,,,37,,,,37,,,
50 DATA108,108,108,108,106,101,1
08,108,108,104,101,108,108,108,1
04,,101,,,,101,,,,37,,,,37,,,
55 DATA,,,,106,101,,,,,,101,,,,,
101,,,98,101,96,,98,37,,,,37,,,
60 DATA107,99,99,99,106,103,,,,,
103,99,99,99,99,106,103,99,99,10
6,103,99,99,106,39,34,,,39,34,,
65 PRINTSTRING$(32,243);
70 T=80:K=1:SW=41:MU=RND(-TIMER)
75 DIM B$(SW),W$(SW),P$(SW),P(SW
),Q(41),C(7)
80 FORI=1TO7:C(I)=(I*16)+143:NEX
T
85 XX=&HFF00:YY=&HFF7E
90 POKEXX+1,52:POKEXX+3,63
95 POKEXX+35,60
100 GOTO140
105 FORII=1TOLEN(A$)
110 IF PEEK(YY)AND 128=0 THEN110
115 POKEYY,ASC(MID$(A$,II,1))
120 NEXTII
125 IFPEEK(YY)AND128=0THEN125
130 POKEYY,13
135 FORHH=1TO70:NEXTHH:RETURN
140 A$="HEAR IT AND SPELL IT.BY
FRED B  SKERBO..COPPEERIGHT NI H
N TEEN EIGHTY SIX":GOSUB105
145 PRINT@422,"  BY FRED B.SCERB
O  ";
150 PRINT@454," COPYRIGHT (C) 19
86 ";
155 FORI=1TO20:READW$(I),P$(I)
160 IFW$(I)="END"THEN170
165 NEXTI
170 A$="PRESS ENTER TO BE GIN":G
OSUB105
175 LN=I-1
180 FORI=1TOLN
185 P(I)=RND(LN):IF Q(P(I))=1THE
N185
190 Q(P(I))=1:NEXTI
195 IFINKEY$<>CHR$(13)THEN195
200 FOR PY=1TO LN:C=PY
205 G=RND(7)
210 FT=0:NT=0
215 CLS0:PRINT@0,STRING$(64,C(G)
):PRINT@96," O.K.  LET'S TRY TH
IS ONE !"
220 A$="O K LETS TRY.THIS ONE":G
OSUB105
225 PRINT@128,"  HOW WOULD YOU S
PELL .....?":PRINT:PRINTSTRING$(
64,C(G));:A$="HOW WOOD YOU SPELL
```

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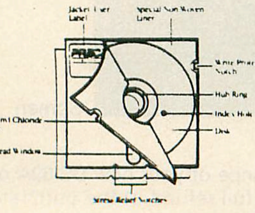

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```
 ":GOSUB105
230 FORDL=1TO1400:NEXTDL:PRINT
235 C$=W$(P(C)):A$=P$(P(C)):GOSU
B105:PRINT
240 P=LEN(C$):PRINT@299,STRING$(
P,"*"):PRINT
245 GOSUB105
250 PRINTSTRING$(64,C(G));
255 FORDL=1TO900:NEXTDL
260 FORI=1TOP:B$(I)=MID$(C$,I,1)
:NEXTI
265 PRINT@448," PRESS <SPACEBAR>
 TO SAY WORD.  ";
270 FORI=1TOP
275 PRINT@330+I,"^";
280 X$=INKEY$
285 IFX$=" "THENGOSUB105
290 IFX$="@"THEN400
295 PRINT@330+I," ";
300 IFX$<"A"THEN275
305 IFX$>"Z"THEN275
310 PRINT@330+I," ";:IFX$=""THEN
275
315 PRINT@298+I,X$;:A$=X$:GOSUB1
05:IFX$=B$(I)THEN340
320 FORY=1TO5:NEXTY
325 NT=NT+1:A$="NO NOT "+X$:GOSU
B105
330 FORDL=1TO500:NEXTDL:A$=P$(P(
C))
335 PRINT@298+I,"*";:GOTO275
340 A$=P$(P(C)):NEXTI
345 A$="VERY GOOD.":GOSUB105
350 A$=P$(P(C))+" IS SPELLED.":G
OSUB105
355 FORDL=1TO2600:NEXTDL
360 FORI=1TO P:A$=B$(I):GOSUB105
:V=ASC(B$(I))
365 FORG=1TO6:PRINT@298+I,CHR$(V
+32);:FORDL=1TO25:NEXTDL:PRINT@2
98+I,B$(I);:FORDL=1TO25:NEXTDL:N
EXTG:NEXTI
370 FORDL=1TO200:NEXTDL:A$=P$(P(
C)):GOSUB105:GOSUB105
375 IF NT=>1THEN NW=NW+1 ELSE NC
=NC+1
380 PRINT@448,"   PRESS <ENTER>
TO CONTUNUE.  ";
385 FORDL=1TO900:NEXTDL:A$="PRES
S ENTER TO CON TIN U":GOSUB105
390 IFINKEY$<>CHR$(13)THEN390
395 NEXTPY
400 CLS:PRINT@101,"YOU TRIED"NC+
NW"WORDS AND":PRINT@165,"SPELLED
"NC"CORRECTLY"
405 PRINT@229,"WHILE DOING"NW"WR
ONG."
410 NQ=NC+NW:IF NQ=0THEN NQ=1
415 MS=INT(NC/NQ*100)
420 PRINT@293,"YOUR SCORE IS"MS"
%."
425 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
430 X$=INKEY$:IFX$="Y"THEN RUN
435 IFX$="N"THENCLS:END
440 IFX$="C"THEN205
445 GOTO430
1000 DATA ALLEGIANCE,AH LEEJENTS
1010 DATA MIXTURE,MIXTURE
1020 DATA ENCYCLOPEDIA,EN SI CLO
 PE DEEAH
1030 DATA MECHANIC,MEHKAHNIK
1040 DATA INDUSTRIAL,INDUHSTREE
AHL
1050 DATA ALCOHOL,AL COHALL
1060 DATA ELECTRICITY,E LEK TRIS
SITY
1070 DATA SOLUTION,SO LU SHUN
1080 DATA INVENTORY,INNVVIN TORY
1090 DATA SUPERMARKET,SOO PPER M
AR KET
5000 DATA END,END
```

***
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Continued from Page 10

BRICKBATS

Editor:

I have a few complaints about Four Star Software and *Penpal*. I purchased *Penpal* early this year and had only one problem at first, and that is the same one that Graham Langford wrote about in the November issue.

Occassionally when you press the A it instantly prints a@a@a@, or ihihih when the I is pressed. I wrote to Four Star about this, but got no response.

The next problem I had was when I tried the Sort routine in the database module. It does not use the computer's memory at all to sort and does all the sorting by accessing the disk intermittently. A sort of 120 items took 15 minutes. I did another sort and about halfway through, the drive crashed and I got a File Structure Error.

The next problem was when I bought a new Dual TEAC drive. When I tried to load a file from one of the modules I kept getting a Drive Not Ready error. I found out that if I quickly pressed the load function immediately after getting the error that the file would load. As long as the drive was still on from the first try, it would work. Needless to say, it was very difficult to type in a file name the second time before the drive shut off. It seems that the program simply does not give the drive enough time to come up to speed, even though it seems to almost instantly.

Dan Page
Churchill, Manitoba

PEN PALS

- I am looking for some pen pals. I have a 64K CoCo 2, disk drive, tape, modem, DMP-110 printer, and speech and sound pak.

Steve Poates
2056 South McVay Drive
Mobile, AL 36605

- I am 35 years old and would like to correspond with CoCo users, especially in the northwest Arkansas four-state area. I have a 64K CoCo with disk, cassette and a DMP-105 printer.

David Knight
305 N. Main
Bentonville, AR 72712

- I am 15 years old and have a CoCo 2, a Modem I, two disk drives and a DMP-100 printer. I would like to hear from people from all over the world. If you have a modem or just want to talk about something, call me at (805) 398-1029. Do not call after 10 p.m. (Pacific time) on weekdays.

Don Lawson
4309 Eakins Court
Bakersfield, CA 93311

- I would like some pen pals in the CoCo Community.

Todd Weakley
643 E. Hawthorne Street
Ontario, CA 91764

- I am looking for some pen pals from the Delaware, Maryland, Pennsylvania or New Jersey areas.

Steve Slack
6 Saddle Circle
Newark, DE 19711

- I would like some pen pals in the Claymont/Wilmington area. I have a CoCo 2, disk drive, cassette, TRP-100 printer and direct connect modem.

James E. McDowell
4C Rector Court
Wilmington, DE 19810

- I am looking for pen pals. I have a 64K CoCo, one drive and one printer modem.

Lance Easley
141 E. Gadsden Lane
Cocoa Beach, FL 32931

- I am 16 years old and looking for a pen pal. I have a 64K CoCo, one disk drive and a 300 baud Modem II. I have lots of games, Adventures, etc., so someone send me a letter.

Steve Sizemore
25250 SW 145 Avenue
Homestead, FL 33032

- I am 13 years old and looking for pen pals who are game nuts. It can be BASIC, binary, graphics, Adventures, etc. I love all games.

Chris Weiss
10106 S.W. 22 Terrace
Miami, FL 33165

- I am 15 years old and I have been to Japan twice for a total of four months and speak fluent Japanese. I have been programming in BASIC for five years. I have a CoCo 3 with four drives, a modem, printer, multipack and Speech/Sound Pak. I'm looking for a pen pal, preferably one who has the same interests and speaks (or is) Japanese.

Nimisi Malle
1245 Thrush Avenue
Miami Springs, FL 33166

- I am 15 years old and would like pen pals aged 15-21 years, preferably from England, France, Germany, Scotland or from any other foreign country.

Paula Vaske
3719 Casaba Loop
Valrico, FL 33594

- I would like to be a pen pal with anybody. I am 13 years old and have a CoCo 2, disk drive and a sound and speech cartridge.

Alex Abraham
555 Wyncourtney Drive
Atlanta, GA 30328

- I am 15 years old and in search of other teenage CoCo nuts. I have a 64K CoCo 2, CGP-220, two TEAC DSDD drives and a modem.

Tony Belehradek
3514 So. Elmwood
Berwyn, IL 60402

- I have a CoCo 2, disk drive and modem, and I'm into all types of games, Simulations, Adventures and war games. If anyone has the same interests please contact me.

Raymond Lueders
1341 Sea Biscuit Lane
Hanover Park, IL 60103

- I am 16 years old and have a CoCo 2, DMP-105 printer, disk drive and cassette player. Anyone with at least a tape player can write me. I will answer all letters (SASE required).

Dane Kramer
802 N. DeQuincy
Indianapolis, IN 46201

- I am 15 years old and own a 64K CoCo, cassette recorder and disk drive. I'd like to have other CoCo pen pals from anywhere around the world.

Scott Stevens
1810 Peachtree Drive
Valparaiso, IN 46383

- I am 17 years old and looking for a CoCo pen pal. My present system consists of a 64K CoCo 2, cassette recorder, FD-500 disk drive and a DMP-105 printer. I plan to purchase the new CoCo 3.

Andrew Urquhart
6813 Arthur Street
Metairie, LA 70003

- I am a 22-year-old looking for pen pals. I have a CoCo 2 and 3, four disk drives and cassettes. Will answer all replies.

Bill Morse
2 Ford Street
Haverhill, MA 01830

- I have both the CoCo 2 and 3, one disk drive and Gemini 10X printer. I would like to write to someone who has worked with *EDSTAM+*, *VIP Writer/Database* and *Musica 2*. I teach at a multi-grade Christian school and would like to hear from other teachers.

Mike Lowe
200 N. High
Charlotte, MI 48813

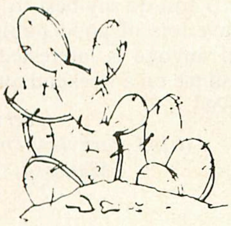
- I am 32 years old and have a 64K CoCo 2 with double disk and cassette. I would enjoy corresponding with adults of similar interests.

Dennis Lytle
1920 Burnham
Saginaw, MI 48602

- I am looking for pen pals. I have an older 64K CoCo with a drive, DMP-105 and CGP-220 printers and Flatbed Plotter 215. Also a 32K Model 100 computer. I would like to hear from anyone interested in any of these.

Shirley Towns
Box 3573
Bozeman, MT 59772

- Are you interested in having CoCo Computer pen pals from all over the world? I write dozens of letters each week to pen pals and I know that many of them would like to hear from other CoCo users. If anybody



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WARP FACTOR X (Rainbow Review 2/86)

If you have been waiting for a game for your color computer that has everything, your wait is over. **WARP FACTOR X** is here. This all graphics simulation game requires strategy, fast thinking, an eye for detail, and above all experience in knowing the capabilities of your starship and its computer. (See review in Feb. 85 issue of Rainbow.) It requires 32K one disk drive and comes packaged in a vinyl library case. **$34.95**

DARKMOOR HOLD (Rainbow Review 8/86)

You and your comrades will explore the levels of Darkmoor Hold in an effort to gain great riches and defeat the dark wizard. The Wizard will soon realize the threat you pose and the many monsters you meet and battle will become stonger and more powerful as you move through the 10 levels of Darkmoor. A keen eye will help you find weapons and armor to aid your battle along with treasures for you to keep. Your party consists of a Dwarf, an Elf, and you, the Human, each with their own special attributes. The weapons, armor and treasure are placed randomly in each level to provide a new challenge each time you play. You may also save the game you are playing since defeating the evil Wizard is not an easy task. It has great graphics and an impressive text screen to give you more fun than a barrel of elves. Requires 64KEB and 1 disk drive. **$29.95**

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is interested, please send me a letter telling me what kind of system setup you have and I'll try to match you up as close as possible with other CoCoZoids.

Erick Molnar
65 A Park Street
Reno, NV 89502

• I have a 64K Extended Color BASIC CoCo 2 with one disk drive. I'm a loyal RAINBOW reader and would like a pen pal.

Chipper Pulitzer
Box X - Palmer Hill Road
Au Sable Forks, NY 12912

• I am nine years old and have a CoCo 2 with 64K and a cassette recorder. I also like Adventure games.

Jonathan Wanagel
266 Sheldon Road
Freeville, NY 13068

• I am looking for a technically minded pen pal to share programming and hardware ideas with. I have a 64K CoCo and one disk drive.

Jason Forbes
RD 2, Box 380
Hurlbut Road
Mexico, NY 13114

• I am 14 years old and looking for a pen pal. I have a 64K CoCo 2 with one disk drive.

David Morgan
621 Chatham Street
Rome, NY 13440

• I would like a pen pal. I have a 64K CoCo 2, disk drive, cassette recorder and TP-10 and DMP-100 printers.

Michael J. Clerico
2648 Riverside Avenue
Seaford, NY 11783

• I am looking for a pen pal.

John Whita
4141 Hamilton-Eaton Road
Hamilton, OH 45011

• I am looking for anyone who can write me and tell me what they know about computers. All letters will receive a reply.

Lisa Brabb
419 Bellevue
Springfield, OH 45503

• I am 15 years old and would like to get in touch with all CoCo users in Oklahoma. I own a 64K CoCo, two disk drives, an Epson RX-80 printer and cassette player.

Brandon Knight
RT. 2
Sulphur, OK 73086

• I am looking for a pen pal outside of the U.S. I am 17 years old and have a 64K CoCo 1 and a 128K CoCo 3, two disk drives, a Line Printer VII and a cassette player.

Scotty Hulshof
35468 Riverside Drive SW
Albany, OR 97321

• I am 13 years old and looking for a pen pal. I have a 16K ECB CoCo (soon to be upgraded to 64K), DMP-105 printer and a CCR-81 cassette recorder.

John Mahan
P.O. Box 1043
Cave Junction, OR 97523

• The International (80) Pen Pal Club is being started. Any CoCo owner can join. You must have a disk or cassette player.

Nevin Keller
136 S. 15th Street
Easton, PA 18042

• I am looking for a pen pal who likes to program in BASIC with assembly language subroutines. I have a 64K CoCo 2 cassette system.

Brian Lipscomb
5106 Whitby Avenue
Philadelphia, PA 19143

• I am looking for some CoCo pen pals in the Uniontown area. Write or call me at (412) 437-6215.

Chuck Mills
222 Evans Street
Uniontown, PA 15401

• I am 15 years old and am looking for a few pen pals from anywhere. I have two disk drives, printer, 64K and soon, a CoCo 3. Anyone with similar setup who is interested in games and programming, write me.

Brad Bansner
2006 Apple Place
Wyomissing, PA 19610

• I would like to know if there are any high school girls who like to program and want a pen pal. I am a junior at Greenwood High School. My setup is a CoCo with RAM disk, one disk drive, printer and Multi-Pak.

Patrick Malone
4 Harper Lane
Greenwood, SC 29646

• I would like to have some pen pals. I own a CoCo 3 and I'm interested in hearing from other people with the new computer.

Dave Bell
116½ S. 300 East
Smithfield, UT 84335

• I would like to correspond with other CoCo readers. I have a 64K CoCo 2, a DMP-105 printer and a tape recorder.

Richard L. West
3946 Tuscaloosa Way
West Jordan, UT 84084

• I am interested in getting a CoCo pen pal. I operate a BBS at (703) 365-2018 in Virginia. I have a CoCo 2, two disk drives, modem, cassette, DMP-105 printer and a Real Talker.

Ricky Sutphin
Route 1, Box 20
Henry, VA 24102

• Anyone interested in a pen pal please contact me. I will do my best to answer all letters. I have lots of good public domain software. If anyone is interested, send an SASE or call me on a weekend afternoon at (703) 361-5244.

Jerry Rossano
10153 Parkview Drive, No. 8
Manassas, VA 22110

• I would enjoy having a pen pal. I'm 14 years old and own a TRS-80 computer.

Tosha Reetz
1102 Oak Street
Bloomer, WI 54724

• I am looking for pen pals of any age. I am 27 years old and own a 64K CoCo 2 with a disk drive.

John Lentz
5100 W. 13421 Loomis Drive
Muskego, WI 53150

• Once again I'm looking for pen pals who would like to co-author some programs with me. If you are interested or if you only have the idea for a program, contact me.

Bill Bernico
708 Michigan Avenue
Sheboygan, WI 53081

• I am 17 years old and a proud owner of a CoCo 2 and CCR-82 recorder. When I moved from Holt, Missouri, to Cheyenne, I found almost no support for the CoCo. I am looking for a pen pal and/or club in the Wyoming area.

Doug Humphrey
514 Melton, Apt. A
Cheyenne, WY 82009

• I have been corresponding with several people who have written to RAINBOW asking for pen pals. I would enjoy corresponding with mature, but still fun, CoCo users, especially any who play Dungeons and Dragons. I have a 64K ECB CoCo 1 with disk drive, printer, tape and modem.

Paul "Stalker" Ingraham
2948 Killarney Drive
Prince George, British Columbia
Canada, V2K 2B1

• I'm currently looking for a pen pal with an Amiga 1000. Does anyone have an Amiga and a CoCo? If so, drop me a line. I find it very interesting to take my old issues of RAINBOW and convert the programs to the Amiga. I have some demos that you would not believe.

Leonard MacEachern
RR 1, Port Hastings
Inverness County, Nova Scotia
Canada B0E 2T0

- I am interested in acquiring pen pals from anywhere in the world. If interested, please contact me.

Rick McIntyre
50 Haggerty Road
Newbury, Ontario
Canada N0L 1Z0

- I am 16 years old and have a gray CoCo upgraded to 64K equipped with a DCM-3 modem and a TP-10 printer. Searching for someone particularly in Canada.

Derek Boucher
Box 341
Bonaventure, Quebec
Canada G0C 1E0

- I would like pen pals to exchange hints and tips, ideas, discoveries, etc. I am 17 years old and own a 64K CoCo, Epson LX-80 printer, a graphics tablet and a tape recorder. I love making programs for myself and other people. No matter how old you are, or where you live, write to me.

Jean-Francois Darmezin
217 Brock Street
Cowansville, Quebec
Canada J2K 2H6

- I'm 13 years old and own a 16K TRS-80 CoCo extended.

Roberta Book
P.O. Box 774
Assiniboia, Saskatchewan
Canada S0H 0B0

- I live in a small town called San Rafael and I am a new RAINBOW reader. I own a 64K CoCo 2 with a CCR-81 cassette recorder. I am 14 years old and looking for CoCo (or compatible) owners anywhere. If anyone is interested in having a pen pal in Argentina, please write me.

Carlos E. Fernandez
Maza 176
San Rafael, Mendoza 5600
Argentina

- I would like to hear from pen pals around the world and of any age. I have a 64K ECB with one disk drive and a tape system.

R. Makrievski
4 Delamare Drive
St. Albans, Victoria 3021
Australia

- Are you interested in having a CoCo pen pal? If yes, then write to me. I'm 16 years old and have a 64K CoCo 2 with cassette recorder.

Derchain Stephan
Peltzer Avenue, 4
4800 Verviers
Belgium

- I'm Brazilian and would like to have pen pals from all over the world.

Ricardo Jorge Lopes da Cruz
Rua Santos Moreira, 138
Cordeiro, Recife, PE 50000
Brazil

- I'm looking for pen pals all over the world. I speak German, Spanish, Portugese and, of course, English.

Daniel Streidt
8 Hassan Sabry Street, c/o GTZ
Zamalek, Cairo
Egypt

- I would be very interested in corresponding with any Color Computer users in the Scandinavian or European countries. I have a 64K ECB system with DMP-105 printer and cassette storage. My main interests are in BASIC and assembly language programming, electronics and flying (I am a licensed pilot). I do have flight planning programs, which I developed, if anyone is interested.

Larry L. Bernard
Almtorget 2A
S-21457 Malmo
Sweden

- I would like to get in contact with German CoCo users and, of course, CoCo users from every country. My system is a 64K CoCo 1, two double-sided drives, also DMP-100 and GCO-115 printers. I am using my CoCo in machine language, BASIC, FORTH, LOGO, PASCAL and C.

Hans-Joerg Sebastian
Kalkumerstr. 96
4000 Duesseldorf 30
West Germany

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The CoCo Is Music to the Ears

By Tony DiStefano
Rainbow Contributing Editor

A long time ago, I did an article on an analog-to-digital converter. I explained that you can take a varying signal and convert it into a digital value from 0 to 255. This time I'll do the opposite.

This month's project is called a D-to-A converter, where a digital value from 0 to 255 is converted into an analog voltage. But that is just part of it. I'll show you how to make two of these things. With two of these and some software, we will be able to make music in stereo. Our scenario starts by making two D-to-A converters. Then, with a couple of preamps, some connectors, a stereo system and some software you'll be playing computer music. We'll start today with the D-to-A converters and finish up next month with the preamp and some music software.

You can buy a complete, two-channel D-to-A converter chip, but they are a little expensive and most require three voltages. This is a problem with the one-voltage CoCo 2 and 3. Besides, it's more fun building your own. Now, let's get into some theory on D-to-A converters.

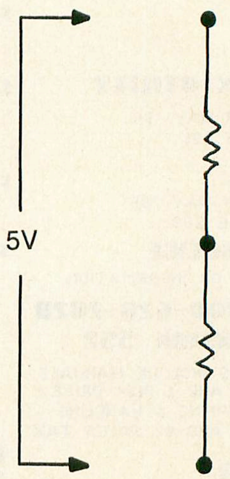
Remember that a digital value from 0 to 255 is made up of eight binary bits. Each of these bits has a value of 0 (ground) or 1 (5 volts). If you use every combination of eight bits, you come up with 255.

Let's introduce another component: a resistor. Yes, the good ol' resistor. If you put a voltage between the two points of a resistor, you could measure the voltage across it. If you put two resistors in series (Figure 1) and measured the voltage across both resistors, you would get the voltage that you put in. For instance, in Figure 1, if you put 5 volts across both resistors, you would measure 5 volts. If you measured across just one resistor, you would get a value somewhat less than 5 volts. If you measured the voltage across the second resistor and added that value to the value of the first, you would get 5 volts. The voltage is divided between the two resistors. If you had three resistors, the sum of the voltages of the three would add up to the total voltage applied. It is a simple mathematical equation and it depends on the resistance value of the resistor. In a resistor circuit, the higher the resistor value, the higher the voltage across it.

If we had 255 different resistors hooked up to a voltage and were able to control which resistor had the voltage on it, we would have an acceptable D-to-A converter. But I'm sure you don't want to hook 255 resistors to some circuit. Well, you don't have to. All you need is nine resistors: eight for the eight data bits and one used as a voltage reference or source. It is used as a divider. This is commonly known as a resistor ladder.

If we use that theory, plus a bit of computer theory, we can convert a digital binary value of eight 0- and 5-volt levels to an analog level. A computer's data bus is continually changing as the computer does its thing. In order to isolate an eight-bit value, a latch is needed. The easiest place to add a latch is on the cartridge port. So, get out the tools and let's get started.

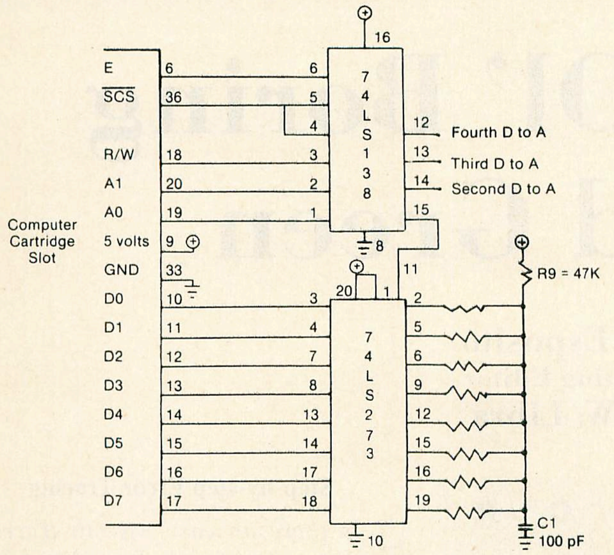
Figure 1



Voltage across R1 plus voltage across R2 equals 5 volts.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

Figure 2



You will need all the usual things for a project. A protoboard, sockets, wire and a few parts. The first two parts are not that hard to find. A good electronics hobby shop will have them. They are a 74LS138 and a 74LS273.

You will see the circuit and how to hook it up to the CoCo bus in Figure 2. If you want stereo or two channels, you will need another 74LS273 and another nine resistors and capacitor. In fact, this circuit can have as many as four channels of D-to-A. All are identical to the one in this diagram except where Pin 11 connects to the 74LS138. Also, nine resistors are connected to each 74LS273. The diagram shows how to connect the other three circuits. The output of this D-to-A converter is about .1 volts on the low end and about 4.9 volts on the high end. The capacitor is used for high-frequency roll-off and to dampen switching noise.

So far, there haven't been any problems, but notice that I haven't given any resistor values. This is where the tricky part comes. The resistor value for R9 is simple: 47K ohms, half-watt or quarter-watt. But the other resistors are a different story. In theory, the value for each resistor is double the previous value. For example, if the first resistor value is 1K ohms, the next value must be 2K and so on. Using this method, the values are:

R1 = 1K ohms
R2 = 2K ohms
R3 = 4K ohms
R4 = 8K ohms
R5 = 16K ohms
R6 = 32K ohms
R7 = 64K ohms
R8 = 128K ohms

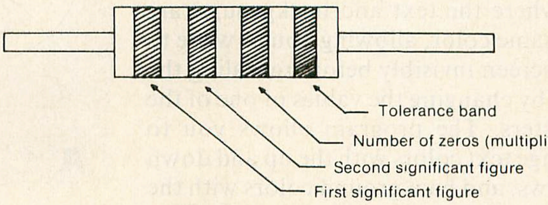
That is fine in theory, but try to find these values in any store! It is next to impossible, but don't despair; you can get these values by using more than one resistor for each value. For instance, a 4K resistor does not exist (unless you want to custom-order it in quantities of 10,000). But, if you put two 2K resistors in series with each other, you get 4K. You see, resistors in series add up in value. A 10K resistor in series with a 22K resistor gives you 32K. Now, the trick is to find the right combination of resistors, to match the values above. Some may require only one or two resistors, but other values will require as many as four or five resistors to add up to the right value. It all depends on what value resistors your dealer carries.

To make matters worse, the precision of the resistors has to be high. The ideal resistor must have a *tolerance* of .1 percent. Again, these are expensive and rare. If you are like me, you have a resistor bin. I went through the bin with an ohmmeter and measured the values and took the closest value. If you are not sure how to read the value of a resistor, Figure 3 shows a resistor color code chart and how to read it. The first and second colors are the numeric value and the third is a multiplier. For example, if you have a resistor that has a color code of red, violet and orange, its value is 27,000 ohms or 27K. Some resistor values are just not made. Here is a table of resistors that I found and used for my D-to-A circuit.

R1 = 1K
R2 = 2K
R3 = 2K + 2K
R4 = 6.8K + 1.2K
R5 = 15K + 1K
R6 = 22K + 10K
R7 = 27K + 27K + 10K
R8 = 100K + 27K + 1K

Again, it is important to have the right values. If you don't have the right values, keep adding more resistors until you do; they aren't expensive. Even after you get the right theoretical values, use a precise ohmmeter to fine-tune these resistors. Remember, the closer the values you use, the better the sound it will make. If your resistors are not perfect, at best, you will get a little harmonic distortion; at worst, you will get a bad sound.

Figure 3: Standard Resistor Color Code



Color	Significant figure	Multiplying value
Black	0	1
Brown	1	10
Red	2	100
Orange	3	1,000
Yellow	4	10,000
Green	5	100,000
Blue	6	1,000,000
Violet	7	10,000,000
Gray	8	100,000,000
White	9	1,000,000,000
Gold	± 5% tolerance	
Silver	±10% tolerance	
No color	±20% tolerance	
Red	± 2% tolerance	

As far as the parts are concerned, you can get the protoboard and the ICs from CRC Inc., 10802 Lajeunesse, Montreal, Quebec, Canada H3L 2E8. The resistors you will have to dig up yourself.

See you next month.

That Same Ol' Boring Black and Green

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

Can I get text colors other than green/black or black/green in the 32-by-16 text mode on my CoCo 3?

Julie Malkemus
Cleveland, OH

℞ The text and background colors are controlled by the registers at &HFFBC and &HFFBD. The following program, `COLORPOK.BAS` allows you to select a color combination. Note that there are 4,096 color combinations to choose from. Of the 4,096, there are 64 where the text and background are the same color, allowing you to write to the screen invisibly before revealing the text by changing the values of one of the registers. The program allows you to change text colors with the up and down arrows, and background colors with the left and right arrows. Use BREAK to exit the program.

```
10 DEF FNM(X) = X-INT(X/64)*64
20 WIDTH32
30 F=1:B=1:CLS
32 PRINT@0,"rainbow color poke"
40 POKE&HFFBC,F
50 PRINT@32,"$FFBC POKE VALUE IS
";F
60 POKE&HFFBD,B
70 PRINT@64,"$FFBD POKE VALUE IS
";B
80 A$=INKEY$:IF A$="" THEN 80
90 IF A$=CHR$(94) THEN F=FNM(F+1
) ELSE IF A$=CHR$(10) THEN F=FNM
(F-1) ELSE IF A$=CHR$(9) THEN B=
FNM(B+1) ELSE IF A$=CHR$(8) THEN
 B=FNM(B-1)
100 GOTO 40
```

Using *Tapefix* With a Disk

I am writing in regard to a program, Tapefix, *which appeared in your June 1986 column in* 80Micro. *What changes are required to use this program on my 64K CoCo 2 with Disk Extended* BASIC *1.0 or 1.1? I have had problems getting it to work properly.*

Robert McClure
Vernon, CT

℞ There was a typo in the program: The '&' that should have preceded the 'H' was inadvertently dropped from Line 280. *Tapefix* is only needed for programs that start below &H600 and are to be used on a disk system. It will not work if the program has copy protection, an auto-loader or is larger than 16K.

Step-by-step Error Tracing

Is there an easy way to trace an error, step-by-step, for a novice?

Rudolph Querard
Levittown, NY

℞ You can use James Provost's `SYNC.BAS` to send a continuous log of your screen display to your printer. This program originally appeared in the August 1984 issue of RAINBOW.

```
10 'sync' BY JAMES PROVOST, RAIN
BOW, 8/84, PG 149
20 FOR X=1000 TO 1007:READ A: PO
KEX,A:NEXT
30 POKE 360,3: POKE 361,232
40 DATA 52,84,189,162,191,53,84,
57
```

CoCo 2 to 3 Upgrade

Can a CoCo 2 be upgraded to a CoCo 3?

Basil V. Fitze
Abbolsford, British Columbia

℞ Since, hardware-wise, the CoCo 3 is a brand new machine that shares few circuits with the CoCo 2, such an upgrade would involve replacing the entire printed circuit board. If Tandy did this and modified the case for the additional ports (RGB and composite video outputs), with a nominal charge for labor, it would probably cost more than the current price for the CoCo 3. You may, however, see some third-party vendors with a CoCo 3 compatible memory upgrade, but as for the new display options, it would not be cost-effective.

How to Save Memory

Does it save memory if I squeeze as many commands as possible into one line using colons, and/or by taking

---

Richard Esposito is a project engineer for TRW's Federal Systems Group. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

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out spaces that do not introduce syntax errors? I like saving memory, but still would like to preserve readability.

Ricky Sutphin
Henry, VA

℞ You save four bytes for every line number eliminated, and one byte for each space eliminated. There is a commercial product, *Packer*, by Bob van der Poel Software, which you may be interested in. It was reviewed in the December 1986 issue, Page 139. You can always keep two versions of your programs: a readable copy for documentation and a packed version for execution — then you'll have the best of both worlds.

Model I — CoCo File Transfer

A local business recently gave me a Model I system, the expansion unit and disk drives 0 and 1. I also have a 64K Extended CoCo with cassette. I have written programs that will run on either. Is there a method or device that will enable me to transfer data and programs between the two?

Brian T. Sprouse
Forest, VA

℞ You can transfer ASCII files between the two using smart terminal programs with both computers' RS-232 ports joined with a null-modem cable. One way to read Model I tapes into your CoCo is by using the *Magic Box*, a cable/software package marketed by Spectrum Projects. Brian, you might also consider using the drives with your CoCo and abandoning that "orphan" machine. All you'd need is a two-drive cable and a disk controller.

Dumping Printer Control Codes

Can your text-dump program be modified so characters that control printer modes can be stripped away?

Edward R. Spadoni
Dedham, MA

℞ The following program, `CHARSET.BAS`, illustrates the problem by poking the values 0 to 255 to screen memory.

```
10 FORI=0 TO 255
20 POKE1024+I,I
30 NEXTI
40 GOTO40
```

Since every one of these values corresponds to a character on the screen, but most printers use some of the codes below 32 for special effects, a character translation table must be constructed to convert these characters' memory values to their corresponding ASCII codes, which are understood by BASIC's `CHR$` function. This table was incorporated into the `DUMP.BAS` program which follows:

```
10 DIM T(127)
20 T(0)=32
30 FOR I=1 TO 26: T(I)=I+96:NEXT
40 FOR I=27 TO 31: T(I)=I+64:NEX
T
50 FOR I=32 TO 63:T(I)=I:T(I+64)
=I:NEXT
60 FORI=64 TO 95:T(I)=I:NEXT
70 FORI=1024 TO 1504 STEP 32
80 A$=""
90 FOR J=I TO I+31
100 X=PEEK(J)
110 IF X>127 THEN X=32
120 A$=A$+CHR$(T(X))
130 NEXTJ
140 PRINT#-2,A$
150 NEXTI
160 RETURN
```

The program corresponding to `CHARSET.BAS` for the 40- and 80-column modes on the CoCo 3 is `HCHARSET.BAS`, which appears in Listing 3 (note the CoCo 3 has no text graphics characters):

```
10 WIDTH40:CLS
20 POKE&HFFA2,&H76
30 FORI=0 TO 255
40 POKE16384+I*2,I
50 NEXTI
60 GOTO60
```

The next program, `HDUMP.BAS` is a subroutine that must appear at the beginning of your program and must wholly reside below the 16384 address in memory. When your program `GOSUB`s to Line 20, the normal ASCII text characters are dumped to the screen. If you also want to dump the extended characters, a table such as that in the `DUMP.BAS` program must be constructed and customized for your printer.

```
10 GOTO140
20 POKE&HFFA2,&H76
30 FORI=16384 TO 20124 STEP 160
40 A$=""
50 FOR J=I TO I+159 STEP 2
60 X=PEEK(J)
70 IF X>127 THEN X=X-128
80 IF X<32 THEN X=32
90 A$=A$+CHR$(X)
100 NEXTJ
110 PRINT#-2,A$
120 NEXTI
130 POKE &HFFA2,&7A
140 REM REST OF PROGRAM FOLLOWS
```

INKEY$ Versus INPUT

Please explain in detail the difference between `INKEY$` *and* `INPUT`*.*

Merl Miller
Albuquerque, NM

℞ The program `INPUT.BAS` is the logical equivalent of this program:

```
10 INPUT A$
20 PRINT A$
```

The additional code complexity would be necessary for most data inputs if BASIC lacked the `INPUT` statement. `INKEY$` only polls the keyboard for an instant and if a key happens to be down at that instant, its value is passed on to the variable that `INKEY$` is assigned to. If a number was being input, the following program would also have to convert the string in `A$` into the corresponding value using the `VAL( )` function.

```
10 A$=""
20 PRINT"? ";
30 B$=INKEY$:IF B$=""THEN30
40 PRINTB$;
50 IF ASC(B$) = 13 THEN 80
60 A$=A$+B$
70 GOTO 30
80 PRINT A$
```

CoCo 2 Mode Boot Up

How can I put my CoCo 3 into CoCo 2 mode?

Jeff Williams
Huntsville, AL

℞ If what you mean by that is to have it boot up with the Disk BASIC 1.*x* banner instead of 2.*x*, then type:

```
POKE&HFFDE,0: POKE&H71,0:
EXEC&HA027
```

However, this won't make your CoCo 3 compatible with all of your CoCo 2 software. What most people mean when they say CoCo 2 mode is that you are using the 32-column screen format.

Disk Interference

I have a CoCo 2 and a CGP-220 printer. I have copies of the CODUMP *and* BWDUMP *programs, which are written for a 16K machine. I put up with the 16K, but now that I have a disk, they don't work at all. Can you help?*

Dan Redding
Gibson City, IL

℞ I do not have copies of the programs you mention, but in the earlier version of Radio Shack's screen dump, you had to change a JMP $8273 to JMP CBA for DOS 1.0 or to JMP $CC1C for DOS 1.1. Perhaps they repeated that mistake in your version. The routines you mention are supposed to be position-independent, and if they are, you can load them with an offset of 16384 in a 32K or 64K machine.

Small Disks Less Than Great

I'm looking for an Amdek 3-inch dual disk drive for my CoCo 2. I have written directly to Amdek, but have received no response. Are there any other suppliers of small drives for the CoCo?

Daniel Moore
Broomall, PA

℞ Regarding the Amdek drives, even if I could find you a supplier, my advice would be don't buy it. If you really want small drives, get the IBM-compatible, 720K, 3½-inch double-sided drives, but with these you will also need one 35- or 40-track, 5¼-inch drive so that you can use it to transfer software from standard media to your smaller disks. The big hoopla about these smaller drives is a myth. The smaller drives do *not* hold more data than it is possible to store on the similar 5¼-inch drives.

The truth is that IBM chose not to market 80-track, double-sided drives for the PC. If you want to talk about storage density, Konica Technology (Sunnyvale, Calif., 408-773-9551) has a new 5¼-inch drive, model KT-510 with a formatted storage capacity of 10.9 megabytes. This drive can also read normal 360K disks. These drives sell for $400 each in OEM quantities and the special 5¼-inch media for $20 each.

Detecting New CoCo 3 Keys

How can I access the F1 and F2 keys on the CoCo 3 from BASIC?

John Chitty
(JMC)
Destrehan, LA

℞ The new keys, ALT, CTRL, F1 and F2, fill in what were the missing positions in the keyboard rollover table on the CoCo 2. You can detect these keys by polling addresses 341, 342, 343 and 344, respectively, for a change in value from 255 to 191.

Corrections

December, 1986: The $199 text-scanner is called Omnireader, marketed by G.A.S. International, Inc., P.O. Box 1282, Euless, TX 76040, (800) 523-4898. It attaches through the RS-232 interface and comes with software for an IBM PC Compatible or Macintosh. It reads Courier 10, Courier 12, Letter Gothic, and Prestige Elite. No CoCo software is available.

November, 1986: A typo appeared in Line 100 of my reply to Scott Lane regarding the `INKEY$` function. The "< >" should be a '='. Thanks to Allen E. Weatherford, Morgantown, N.C., for pointing this out.

November, 1986: A typo appeared in Line 130 of my response to Helga Craig. Drop the "I+" and the ';'. See the answer to Edward Spadoni, this issue, for a much improved version that strips off non-printable ASCII characters that play havoc with many printers, and a new version for the CoCo 3.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

From the Princeton RAINBOWfest . . .

The CoCo 3 Round-Table Tape!

THE RAINBOW recorded the main event of RAINBOWfest Princeton, the Saturday evening (Oct. 18) round-table discussion:

"The Design, Development and Marketing of the CoCo 3."

Speakers included Tandy's Barry Thompson and Mark Siegel, as well as independent CoCo 3 programmers Steve Bjork and Dale Lear (filling in for Greg Zumwalt).

This was a lively and informative session and, therefore, we want as many people as possible to hear what these RAINBOWfest guests had to say.

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A quick cure for I/O Errors

Fast Relief for Tape-Loading Headaches

By Mark Nelson

There are always a few built-in frustrations that go along with the use of any computer system. One of my greatest frustrations with the CoCo, and I'm sure many of you feel the same way, is the tape recorder and those darn I/O Errors. Things get quite a bit better when you get a disk drive, but there are still many times when using the old cassette recorder is the only way to go. For instance, you may subscribe to RAINBOW ON TAPE, and some of the programs you bought before you got a disk drive won't transfer to disk (some don't work with the controller plugged in, anyway).

Let's face it, the tape recorder is an important part of our computer system and we'd better learn to live with it. That's why I wrote *Tape Doctor.* It makes it easier to get along with the tape recorder by changing the CoCo's method of loading programs and files. Specifically, it modifies the way I/O Errors are handled.

The familiar method of handling these errors is to put the infamous `I/O ERROR` message on the screen and then stop everything. With *Tape Doctor*, on the other hand, CoCo informs you of any errors and then continues to load the tape. This way, all good portions of the program or file are still loaded when, otherwise, they would be lost.

The program listing is quite short, so even you "two-finger" typists out there can handle this one. Be sure to save the program *before* you run it, because it erases itself after it runs. *Tape Doctor* requires 64K ECB, and yes, it will work with the disk controller plugged in. I've used it to help me transfer a few hard-to-load tapes to disk.

When you have the program on tape or disk, run it. After a second or two, the "OK" prompt will appear and you're ready to load tape programs and files in the usual way with the BASIC commands `CLOAD`, `CLOADM`, `INPUT#`, etc. When a tape is loading, you'll see a white block appear on the screen after a successful block load (a block is 255 bytes). If an I/O Error occurred during the last block, a black block will appear instead, but the program or file will continue to be loaded. Obviously, if there are some black blocks that come up during the load, there was some faulty data loaded and it will need to be fixed. If it's a BASIC program, you may just want to run it and see where the syntax errors are, fix them and save the program again. Machine language programs are a lot harder to fix unless you're the author, and even then it's no picnic. But, many load errors do not have any great effect on the program's execution. A game might not give you bonus points between rounds anymore, or some other trivial thing might be wrong, but it still may be fun to play.

If you have a program that uses tape I/O, you can use *Tape Doctor* in conjunction with that software by simply running *Tape Doctor* and then your other software. If you have a file you can't load with *Telewriter-64*, you can use *Tape Doctor* to help by following these instructions. `CLOAD "TELE64"`, then when the "OK" prompt appears, type `25 GOTO 100` and press ENTER. Next, type `RUN` and press ENTER. Now, from the *Telewriter* main menu type `B` for BASIC. Load and run the *Tape Doctor*. Type `EXEC 7720` and press ENTER to return to *Telewriter*. You'll be missing about 3.5K of the text buffer.

To disable *Tape Doctor*, press the reset button on the back of the computer, or type `POKE &HFFDE,1` and press ENTER. To re-enable, type `POKE &HFFDF,1` and press ENTER.

I have had pretty good success using *Tape Doctor* to load otherwise unloadable programs and files. I hope you get as much use out of *Tape Doctor* as I have. Now, here are some suggestions on how to avoid I/O Errors in the first place.

The *Tape Doctor* is a last resort method of loading a bad tape. If a tape can be loaded without any errors, that's much preferred. A dirty tape head often causes I/O Errors. You can buy an automatic cleaner that you just put in and "play" like a tape. This is a simple way of cleaning that is better than nothing. However, you can do a better job cleaning by hand. Ask a salesman at any electronics store to show you how to clean the heads with cotton swabs and cleaning solution. A bottle costs less than two dollars and will last you many years. The heads should be cleaned every two weeks or so. A good cleaning will take you less than five minutes, even on the dirtiest machine.

If you still get I/O Errors, try to load

Mark Nelson is a computer science student at Brigham Young University and author of the Second RAINBOW *Adventure Contest winner,* Head of the Beast.

at several different volume settings. Usually, a slightly lower volume should be tried. If you're using batteries in your recorder, buy an inexpensive battery tester and test them once a month or more often if you use your computer a lot. The recorder runs at a slightly slower speed when the batteries are weak. If you do save a program or data onto a tape using weak batteries and you can't load it after you change batteries, try putting the old batteries back into the recorder and loading it then. If it loads, save it again after changing to the fresh batteries.

Probably the most common reason for I/O Errors is misalignment of the tape head. Aligning the head is a simple procedure that takes about two minutes to perform. You will need a small, jeweler's-type, flat head screwdriver. First, unplug the recorder from the computer. Now put the program tape that's giving you trouble into the recorder and press the play button. Locate the alignment hole, a small hole through the plastic case, right above the tape head (NOTE: Some recorders have no alignment hole and have to be taken apart to align). Now, insert the screwdriver into the hold and down into the alignment screw directly below. Turn the screw *slowly* back and forth while listening to the sound of the program. You may want to turn the volume down a little since it sounds terrible. You will hear the sound get clearer, brighter, and higher in pitch, and then as you continue turning, it becomes muffled. The correct setting is where the sound is the brightest and highest pitched. Turn the screw until you're satisfied that you have the clearest sound possible and you're finished with the alignment.

One final tip. If you've loaded a machine language program and you want to resave it, type `CSAVEM "filename",PEEK(&H1E7)*255+PEEK(&H1E8),PEEK(&H7E)*255+PEEK(&H7F)+255,PEEK(&H9D)*255+PEEK(&H9E)` and then press ENTER. Good luck in your battle with I/O Errors!

(Questions about this article may be addressed to Mark at 2A-44 S. Wymount Terrace, Provo, UT 84604. Please enclose an SASE for a response.) ☐

The listing: TAPE DOC

```
5 ' tape doctor
  COPYRIGHT (C) 1985
  BY MARK NELSON
9 CLS:PRINT:PRINT:PRINT"
 tape doctor  ":PRINT:PRINT"
  COPYRIGHT (C) 1985":PRINT"
    BY MARK NELSON"
10 CLEAR 999
20 DATA 26,80,190,128,0,183,255,
222,166,128,183,255,223,167,31,1
40,224,0,37,241,57
40 FOR I=1 TO 21:READ A:A$=A$+CH
R$(A):NEXT I
50 P=VARPTR(A$)+1
60 POKE P,126
70 EXEC P
75 FOR X=0 TO 9:POKE &H9D00+X,PE
EK(&HA7E9+X):NEXTX:'relocate mot
or off routine
80 POKE &HA7E9,&H7E:POKE&HA7EA,&
H9D:POKE&HA7EB,&H00:'branch to r
eset counter on motor off
82 DATA 9F,76,9E,F3,86,9F,A7,80,
9F,F3,9E,76,39:FORX=0 TO 12:READ
 R$:POKE&H9F00+X,(VAL("&H"+R$)):
e
85 POKE &H9E00,&H9F:POKE &H9E01,
&H76:POKE &H9E02,&H9E:POKE &H9E0
3,&HF3:POKE &H9E04,&H86:POKE &H9
E05,&H80:POKE &H9E06,&HA7:POKE &
H9E07,&H80:POKE &H9E08,&H9F:POKE
 &H9E09,&HF3:POKE &H9E0A,&H9E:PO
KE &H9E0B,&H76:POKE &H9E0C,&H39:
'black
86 POKE &HA740,4:POKE &HA745,&H7
E:POKE&HA746,&H9F:POKE&HA747,0:P
OKE&HA741,&H7E:POKE&HA742,&H9E:P
OKE&HA743,0:' branch to routines
 to put square
88 POKE &H9D0A,&H8E:POKE&H9D0B,&
H04:POKE&H9D0C,&HC0:POKE&H9D0D,&
H9F:POKE &H9D0E,&HF3:POKE &H9D0F
,&H39:'routine to reset counter
on motor off
90 POKE &HF3,&H04:POKE &HF4,&HC0
:POKE &HA531,&H12:POKE &HA532,&H
12:POKE&HA4E3,&H12:POKE&HA434,&H
12
1000 PRINT:PRINT"          THE DOCT
OR IS in"
1010 NEW
1020 '      tape doctor
        COPYRIGHT (C) 1985
          BY MARK NELSON
```

Hint . . .

'Uncram' Crowded Tapes

Many people cram several programs on one tape with very little space between each program. If you do this, you may want to follow the steps below when trying to load a program that has been saved later on the tape. It will prevent a lot of headaches.

1. Count the number of programs saved before the program you want to load. Good record-keeping will help in this step.
2. At the beginning of the tape, type `MOTORON:AUDIOON` and press ENTER.
3. Start counting the number of programs by listening for silent spots and, at the same time, type in `CLOAD`, but do not press ENTER.
4. At the end of the program just before the program you are trying to load, press ENTER.

Donald E. Deich, Sr.
Dubuque, IA

PIPELINE

GOING TO THE DOGS New from The Softtech Group is the *Enhanced Greyhound Handicapping* package. This two-program set, which includes both the Enhanced Greyhound Handicapping system and the Wager Return Analysis programs, includes features for professionals, but is designed with the novice in mind. Suggested retail price for the package is $49.99 plus $2 shipping and handling. *Contact Softtech Group, Inc., P.O. Box 582, Keego Harbor, MI 48033, (313) 851-4925.*

PAIRING UP The ProWriter C-210 XP and wide-carriage C-215 XP, which offer dual emulation of the IBM ProPrinter and Epson FX-80+, have been introduced by C. Itoh Digital Products, Inc. Both printers are designed for business applications and are capable of speeds of up to 216 characters per second (cps) in draft mode and 45 cps in near-letter-quality modes. Both the 80-column C-210 XP and the 136-column C-215 XP include automatic vertical and horizontal tabbing, right and left justification and true super- and subscripts. Other features include front panel selection of NLQ and short paper tear-off capability. Centronics-type parallel interface and a 10K buffer are standard, as are both friction and tractor-feed. Graphics resolution is up to 240-by-216 dpi. Suggested retail price for the C-210 XP is $529 and $679 for the C-215 XP. *Contact C. Itoh Digital Products, Inc., 19750 South Vermont Avenue, Suite 220, Torrance, CA 90502, (213) 327-2110.*

HAYES ACROSS AMERICA A feature-enhanced version of the Smartmodem 2400 became available early in the fourth quarter of 1986 from Hayes Microcomputer Products, Inc. The new features are designed to provide easy access to modem configuration settings and to increase stored phone number capacity. The modem is also now capable of Hayes AutoSync communications mode. The new features include the ability to view active and stored profiles and telephone numbers, storage for two configuration profiles in EEPROM, storage capacity for four phone numbers and 36-character capacity for stored phone numbers. Since two unique configuration profiles can be stored in the modem's EEPROM, users can save their two most widely used settings for fast, simple access to selected remote systems. The new features are implemented using new commands that expand the Hayes Standard AT command set. Estimated retail price for the Smartmodem 2400 is $899. *Contact Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348, (404) 449-8791.*

REDUCED RATE FOR 2400 CompuServe Incorporated has announced a cost reduction, making its 2400 baud, dial-up access rate for subscribers the same as the 1200 baud access rate. The prime or daytime rate for 2400 baud access has been cut from $22.50 per connect hour to $15 per connect hour. The standard or evening/weekend rate for 2400 baud access has been cut from $19 per connect hour to $12.50 per hour. CompuServe can be accessed during standard or prime service hours. Standard service hours are from 6 p.m. to 5 a.m. weekdays, and all day Saturday, Sunday and announced CompuServe holidays. Prime service hours are from 8 a.m. to 6 p.m. weekdays. Rates for 300 baud remain at $6 per hour for standard service and $12.50 per hour for prime service time. Costs for 1200 baud access remain at $12.50 per hour for standard service and $15 per hour for prime service hours. Communications surcharges also apply. CompuServe is an H&R Block company. *Contact CompuServe, 5000 Arlington Centre Boulevard, P.O. Box 20212, Columbus, OH 43220, (614) 457-8600.*

FINE PRINT Networx, a supplier of computer and electronic accessories, has introduced a Dot Matrix Cleaning Kit recommended for use on a wide assortment of printers, plotters and typewriters. Normal operation of such equipment leads to buildup of ink, dust, lint and machine-generated debris on print heads. Without regular cleaning, these deposits can cause character blurring and/or unit failure. The kit contains carefully selected and tested materials, safe for use on sensitive electronic and data processing equipment. Each kit includes a 1-ounce printer/plotter/typewriter cleaning agent and one 9-by-36 inch print element cleaning material, used to to clean print heads; one 4-ounce spray can of "Air Clear" for cleaning rollers, tractors and ribbon assemblies; and six office equipment cleaning pads and ink cleaning pads for equipment exteriors and hands. Suggested retail price for the Dot Matrix Cleaning Kit is $29.95. *Contact Networx, 203 Harrison Place, Brooklyn, NY 11237, (718) 821-7555.*

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Requires 32K & Disk, Only $59.95

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Tired of looking at the 16 line by 32 character display on your CoCo? Wish you could see more lines and characters? Then HI-RES II is the answer, it can give you the big screen display you've always wanted. It will display 24 lines of 32, 42, 51, 64 and even 85 true upper and lower case characters per line without extra hardware.

HI-RES II is the most powerful screen enhancement package available for the Color Computer, yet it is the least expensive. It is completely compatible and transparent to Basic. Once the program is loaded, everything works the same as before, only you have a much better display to work with. It even allows you to have mixed text and Hi-resolution graphics on the same screen or have separate text and graphics screens. It also has an adjustable automatic key repeat feature and allows you to protect up to 23 lines on the screen.

HI-RES II features over 30 special control code functions that allow you to change characters per line, protect display lines, change background color, position cursor, switch normal/reverse video, underline, double size characters, erase line/screen/to end of screen, home cursor, character highlight and much more. It works on all models of the CoCo with 16, 32 or 64K and provides automatic reset control so HI-RES II won't disappear when you press reset.

Only 24.95 on Tape or $29.95 on Disk

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Now you can easily Disassemble Color Computer machine language programs directly from disk and generate beautiful, Assembler Source Code. And "The Source" has all the features and functions you are looking for in a Disassembler.

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Requires 32K Disk $34.95

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TEXTPRO III is an advanced word processing system designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formating problems and letter writing, then TEXTPRO III is what your looking for. TEXTPRO works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formating commands you can use without ever leaving the text your working on. There are no time comsuming, and often furstrating menu chases, you are in total control at all times. The formatted output can be displayed directly on the screen, showing you exactly what your printed document will look like before a single word is ever printed. This includes margins, headers, footers, page numbers, page breaks, underlining, column formating and full justification.

DISK $59.95 TAPE $49.95

The CBASIC Editor/Compiler V1.1.2

Do you want to write fast machine language programs but you don't want to spend the next few years trying to learn how ???
Well with CBASIC, you could be writing them right now!

CBASIC is the only fully integrated Basic Compiler and program editing system available for the Color Computer. It will allow you to take full advantage of all the capabilities available in your color computer without having to spend years trying to learn assembly language programming. CBASIC allows you to create, edit and convert programs from a language you are already familiar with Extended Disk Color Basic, into fast efficient machine language programs easily and quickly. We added advanced features like a full blown program editor, Hi-Res text Displays and 80 column hardware support for editing, compiling and your compiled programs. Plus we made it exceptionally easy to use, CBASIC is the friendliest and easiest compiler available for the Color Computer.

"The most complete Editor/Compiler I have seen for the CoCo... " --The RAINBOW, March 1986

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocation and so on, because CBASIC will do it for you automatically. Or, CBASIC will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC features well over 100 compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. CBASIC supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, including Graphics GET, PUT, PLAY and DRAW, all with 99.9% syntax compatibility. CBASIC also supports the built in Serial I/O port with separate printer & serial I/O baud rates. You can send and receive data with PRINT, INPUT and INKEY commands.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing and editing Basic programs. It has block move & copy, program renumbering, automatic line numbers, screen editing, printer control and more.

"The Editor is a very good one and could be the subject for review all by itself..." --The RAINBOW, March 1986

"Comparing ECB's edit mode to CBASIC's text editor is like comparing a World War II jeep to a modern sedan. Both get you to your destination, but what a difference in the ride. -- Hot CoCo, Feburary 1986

The documentation for CBASIC is an 8 1/2 * 11 Spiral Bound book which contains approximatly 120 pages of real information.

"CBASIC's manual is easy to read and written with a minimum of technicalese." --Hot CoCo February , 1986

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. Compare the performance of CBASIC against any Color Basic compiler. Dollar for dollar, CBASIC gives you more than any other compiler available. Requires 64K & Disk, not JDOS compatible.

"The price tag it carries seemed a bit steep for an integer compiler on first glance, but when you add 64K, hi-res drivers, and full-screen editing, CBASIC begins to look more like a bargain.." -- Hot CoCo February, 1986

"A Complete Editor/Compiler Well Worth its Price" --RAINBOW March 1986

EDT/ASM 64D
64K DISK EDITOR ASSEMBLER

EDT/ASM 64D is a Disk based co-resident Text Editor & Assembler. It has a Hi-Resolution 51, 64 or 85 column by 24 line display, so you see your program listings easily and it supports Column cards. The disk also contains a free standing ML Debug Monitor, to help you debug your assembled programs.

This is the most powerfull, easy to use Text Editor available in any Editor/ Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material.

- Local and Global string search and/or replace.
- Full screen line editing with immediate line update.
- Easy to use Single keystroke editing commands.
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- Hi-Res Text Display 28 to 85 columns by 24 lines.
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- Generates listings to Hi-Res text screen or printer.
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- Supports up to 9 open disk files during assembly.
- Allows assembly from editor buffer, Disk or both.

Requires 32K Disk $59.95

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RAINBOWTECH

DOWNLOADS

Hold Those Variables

By Dan Downard
Rainbow Technical Editor

• *Is there a method for the CoCo to run one program, then load a new one while holding all variables at values set by the first program (similar to the* `CHAIN` *command of other computers)?*

Warren Cole
Nashville, TN

Not while using Disk BASIC, Warren. You can pass parameters using OS-9, but you didn't mention if you were using OS-9. About the only thing I can suggest is storing all of your variables in a short random disk file before running your new program. Then you can load the variables back into memory and continue.

Using DSKCON With 128K

• *I have a CoCo 3, with 128K. I want to use DSKCON with the upper memory locations. Because DSKCON only allows the I/O buffer to be in the range of memory locations 0 to 65535, I can't put anything in the 128K range. My question is, how do I use DSKCON, or any routine using a buffer, with the 128K memory range?*

Dave Bell
Smithfield, UT

One of the funny things about the new CoCo 3, Dave, is even though there is plenty of space for graphics in lower memory banks, there is no way of saving or loading the screens. Notice, I said lower memory banks. When initialized, the normal 64K occupies from $70000 to $7FFFF. All other memory is at $00000 to $6FFFF.

There are several programs appearing on bulletin boards for saving and loading this information. Various methods can be used, such as swapping memory banks using the DAT (Dynamic Address Translator), or by use of a machine language program that will access the extra memory.

The only documented way to use the extended memory is by using the `LPEEK` and `LPOKE` functions to copy data from regular to extended memory. I'm sure we will run an article on how to save and load extended memory screens in the very near future.

Crashed Disk Directories

• *I own a 64K CoCo 2 with Extended BASIC, disk drive with Disk BASIC 1.1, and a DMP-105 printer. I have a big problem with "crashed" disk directories. When I try to write over an existing program with the same name, I don't get an AE Error. Disk BASIC writes over the program, but doesn't seem to fix the file allocation table. Any programs that appear after this file are lost. When I try to load these programs I get an FS Error. Please help.*

Randy Adams
Memphis, TN

Randy, I used to have the same problem. Instead of overwriting a file, I cured the problem by first killing the old file before rewriting it. I have had no further problems. If anyone knows what the exact bug is, please write and we'll try to explain why this happens.

Color on CM-8

• *I own a CoCo 3, single drive, DMP-105 printer and a CM-8 monitor. With the CM-8 hooked up to the CoCo 3 as per instructions, most of my programs run in black and white, not color. Radio Shack cannot give me a reason, other than my software is CoCo 2 compatible, and not for CoCo 3. All the programs run in color on a TV monitor, but not the CM-8.*

Greg Kazian
Greer, SC

Greg, with the good comes the bad.

Dan Downard is an electrical engineer and has been involved in electronics for 27 years through Ham radio (K4KWT). His interest in computers began about eight years ago and he has built several 68XX systems.

It's here!

RAINBOW ON DISK!

ANOTHER GREAT SERVICE FROM THE LITTLE ELVES AT THE END OF THE RAINBOW

Remember the story of the cobbler and the elves, when the little people crept into the old man's shop and did all his chores while he slept? Well, there is a monthly chore we can now eliminate for you — transferring RAINBOW ON TAPE to disk!

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Thanks to the elfin magic going into RAINBOW ON DISK, part of one side of the disk is formatted for the OS-9 operating system. That means that you can now get all the OS-9 programs from the magazine — programs that cannot be put on tape. And, with the introduction of the new CoCo 3, OS-9 programs will become more and more prevalent.

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* Don't miss out. During this extended introductory offer, good until March 15, 1987, subscriptions to RAINBOW ON DISK are only $90 a year in the United States (regularly $99). Canadian rate U.S. $100 (regularly $115). All other countries U.S. $115 (regularly $130). RAINBOW ON DISK single copy rate is: $12 within the U.S.; Canadian rate U.S. $14; all other countries U.S. $16. Kentucky residents add 5% sales tax. All subscriptions begin with the current issue unless otherwise specified. Please allow 6 to 8 weeks for first copy. U.S. currency only, please. In order to hold down non-editorial costs, we do not bill.

RAINBOW ON DISK and RAINBOW ON TAPE are not stand-alone products, but are intended as adjuncts and complements to the magazine. Even if you purchase RAINBOW ON DISK or RAINBOW ON TAPE, you will still need the magazine for loading and operating instructions. For information on RAINBOW ON TAPE, see Page 103.

To order by phone (credit card orders only), call (800) 847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492.

The CM-8 is an RGB analog monitor. Previously, CoCo 2s produced composite video using an adaptor. You cannot obtain the same resolution with a composite monitor as you can with an RGB monitor. In this context, you have purchased a superior monitor. At the same time, different signals are used for RGB from the computer to the monitor. Using the CoCo 2 and a composite monitor, quite a few of the more recent graphics programs used artifact colors, which relied on composite video's colorburst signal. The CM-8 monitor is not capable of displaying artifact colors.

A big argument is brewing on whether the CM-8 is the proper monitor for the CoCo 3. I think the main contention is that it is not compatible with a great deal of existing software, as in your case. Many other RGB monitors have a composite video mode and will display artifact colors. As soon as some of these monitors are submitted for evaluation, we will give you our opinion. In the meantime, there is nothing wrong with your CM-8. I'm sure you'll be satisfied with your CM-8 when more software is available that uses its capabilities.

By the way, for those readers with composite monitors, try the following to get a readable 80-column screen:

```
WIDTH80:PALETTE8,255:PALETTE0,0
```

Novice Upgrade

• *I have a 16K Korean CoCo 2 ECB and I went to Radio Shack to ask about having it upgraded to 64K. They told me it would cost about $70 with parts and labor, and I would be better off buying a 64K CoCo 2 ECB on sale for $99 (at the time). While thinking this over, I purchased my first copy of* THE RAINBOW. *I noticed several ads for upgrade kits for about $30. Although the ads say that all instructions and parts are included, the problem is that I have practically no experience in computer or electronic technology. Is it feasible for a novice to attempt such an upgrade on his own? I have gathered from the ads that one solder joint is required in upgrading my model, but I am otherwise in the dark as to how difficult the procedure would be.*

J.S. Grossman
Lubbock, TX

In the case of the Korean CoCo, upgrading will consist of replacing a few chips, in sockets, by the way, and connecting two pads by soldering a jumper between them. The instructions I have seen are more than adequate. I'd try it myself, even if I were a novice.

CoCo 3 Drive Compatibility

• *Presently I am using an original gray-case CoCo (E board) with drives 0 and 1 and would like to know if these drives (Part No. 26-3022) and controller (Part No. 26-3022) are compatible with the CoCo 3. And, if not, what do I have to do to make them compatible?*

Kenneth Stark
St. Ann, MO

Ken, you need 12 volts for your particular controller. Experience has been that it doesn't have to be well regulated. Find 12 volts in the power supply of your CoCo 3 and run a jumper to Pin 2 on the cartridge connector. Make sure Pin 2 is not grounded. This may require cutting a trace on the circuit board.

If you don't want to experiment, buy a Multi-Pak. It has the 12 volts necessary on the bus for the older disk controllers.

Disk Controller Necessity

• *Is there any way you can use a disk drive through the I/O port without having to use the special adapter that fits into the cartridge port?*

Michael S. Novak
Virginia Beach, VA

Michael, the special adapter you are referring to is the disk controller. It allows the computer to communicate with the disk drives, in addition to containing the Disk BASIC software. You need a controller to use your disk drives. I wouldn't recommend building your own.

There are alternate disk controllers on the market. Alternate disk drives are also available. The only drawback is that the software used by non-standard controllers is also, for the most part, non-standard. I'm not saying you must use a standard controller, but be sure you are aware of the consequences if you do not. Maybe you could obtain a non-standard controller with standard software. It's possible if you order your ROM from Radio Shack. Make sure the controller will accept it.

BASIC Program Merging

• *I have seen numerous procedures for merging BASIC programs on the CoCo and they all appear to be essentially the same. For instance, after loading the first program, let* `X1=PEEK(25)`, `X2=PEEK(26)`, `X3=PEEK(27)`, `X4=PEEK(28)`. *Providing that* `X4` *is not 0 or 1,* `POKE25,X3:POKE26,X4-2` *and load the second program. Renumber, if necessary, so that the line numbers don't overlap, then* `POKE25,X1:POKE26,X2`.

More often than not, I find that this process restores the first program, but loses the second, both on my 32K CoCo and my 64K. The results are the same regardless of whether my disk drive is connected and wherever in memory `PMODE` *or* `PCLEAR` *commands force the program to reside.*

Harry M. Stern
Miami, FL

You have to rearrange the procedure you are using, Harry. Renumber the second program before you load it. Make sure the line numbers do not overlap with the first program. Then, you should be in good shape.

After loading the first program, memory locations 25 and 26 contain the beginning address of your program. Locations 27 and 28 contain the ending address. You essentially tell the computer to start loading the second program at the end of the first by `POKE25,X3:POKE26,X4-2`. The `-2` overwrites the end of file. Load your second program, put the original addresses back in memory locations 25 and 26, and save the combined programs.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` to arrive at the EXPERTS> prompt, where you can select the "Downloads" online form which has complete instructions.

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KISSable OS-9

Frank Hogg Sees the Light and a Level II Report

By Dale L. Puckett
Rainbow Contributing Editor

The speaker is Barry Thompson, the man who buys and sells Color Computers in the Tandy Towers at Fort Worth.

"If you're looking for opportunity, look no further. The potential installed base is in the millions. In fact, the installed base of the CoCo 2 is already in the millions."

As he should be, he is enthusiastic about the future of the new Color Computer 3 as he talks to members of the CoCo Community Breakfast during RAINBOWfest Princeton. Yet, Thompson isn't the only one bullish about CoCo 3 prospects. At the OS-9 Community Buffet the next morning, Frank Hogg of FHL in Syracuse, N.Y., picked up the CoCo 3 ball and ran with it.

"You have inside information!" Hogg said. "With your knowledge of OS-9, you can seize an opportunity."

Hogg thinks the CoCo 3 has a very bright future and he's putting his money and marketing skills where his mouth is.

"You can grab the brass ring, make merry and have fun like we have," Hogg said. "Or, you can sit on the merry-go-round and watch the world go by. The choice is yours."

FHL plans to sell *Sculptor*, a fourth-generation database application that will run on 40 different microcomputers, to CoCo 3 owners soon. Hogg believes that half of the people who own Color Computers today will buy a CoCo 3.

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and coauthor, with Peter Dibble, of* The Official Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives on Governors Island in New York Harbor.*

"Then they'll be looking for things to buy!" Hogg said. "The CoCo 3 can be the opportunity of a lifetime for you. Fill a void! Find a need! Fill it! But remember — more than anything else — it is very important that you be first with your application."

Hogg told the three dozen OS-9 Users Group members present that most software developers haven't been getting the message that they must use OS-9 to capture the capabilities of the CoCo 3. He also told the developers that when they write OS-9 software for the CoCo 3, they will also be writing for the future, noting that any software written with 6809 OS-9 development tools can easily be carried into the 68K world.

"Software written in C, BASIC09 or PASCAL on the Color Computer is directly compatible with OS-9 68K," Hogg said. "Applications written with our *Sculptor* development system can be carried directly to more than 40 different computers, including most of the IBM clones."

Hogg was so enthusiastic about the CoCo 3 and OS-9 Level II opportunities that we asked him to do an exclusive interview for "KISSable OS-9" readers. Some of his answers may surprise you — especially if you read his now infamous blast at the Color Computer and OS-9 two years ago.

More Powerful Than a GIMIX III

Dale: How does the CoCo 3 compare to other 6809 OS-9 computers you have used?

Frank: It knocks their socks off! The CoCo 3 with OS-9 Level II and windows is probably one of the most powerful computers around. It is far more powerful than the GIMIX III I paid $12,000 for four years ago. And, the CoCo 3 only costs a few hundred dollars. As a single-user computer, the CoCo 3 can do just as much work for you as the GIMIX III. We ran our office with software developed under *Sculptor* on the GIMIX III for several years. Yet, with a CoCo 3, OS-9 Level II and windows, we could do a better job — faster than with the GIMIX III!

Dale: That's hard to believe.

Frank: Yes, I know it seems unbelievable, since the CoCo 3 runs at 1.8 MHz and the GIMIX III runs at 2 MHz. But, the GIMIX III must share time between several users on different terminals. Having the CoCo with windows is like having several terminals on the same screen.

For example, when we create an invoice, we need to jump from one screen to another. With the CoCo 3 we can use a different window with the flick of a key! Put in the customer information, press a key and instantly we can enter the invoice. Press the key again and we can write a letter. If the phone rings, we press the key again and we're back in the invoice program. When the phone call ends, we press it again and like magic we're back at work with our letter.

When we installed our office system in 1982 we paid almost $1,000 for the terminals alone. Now we can get the complete CoCo 3 with drives and everything for half that.

Dale: So do you think the CoCo 3 will be a good business computer?

Frank: It's good for anything and

everything. For business, it's perfect. For home use, it's perfect too — both inexpensive and powerful. Of course, the key to all of the CoCo 3's power comes from OS-9, its new windows and the software that runs them.

Dale: What kind of software will FHL offer for the CoCo 3?

Frank: We plan to release a significant number of applications. As you know, we have had software running on OS-9 Level II for several years that we couldn't offer to the CoCo 2 community because of the lack of available memory. The new CoCo 3 with OS-9 Level II and 512K lets all that software work — and very well, I might add.

The first and most important product we have for the CoCo 3 is a specially priced version of *Sculptor Plus*. CoCo 3 owners will be able to buy it for half the price of other Level II system owners.

Dale: That would make the price about $495. Isn't that too steep for the CoCo market?

Frank: Well, the very same product compiled from the same source running on a VAX minicomputer sells for close to $15,000! At $495, the CoCo version is a real bargain. I can't begin to describe here what *Sculptor* is or what it can do. However, to help your readers discover the power and capabilities of *Sculptor*, we will be releasing a demo disk at a very low price, $5 or so, and it will be copyable. This means they will be able to see how it works for themselves. We'll also be selling the *Sculptor* run-time package for $99. To make that a bargain, we plan to sell a large number of application programs written in *Sculptor* for $10 to $50. For that price you'll receive both the source and object. This means you will be able to run the application right away. Later, if you decide to pick up the full *Sculptor* package, you'll be able to modify those programs so they will be a perfect match for your business.

Dale: Why do you think *Sculptor* will be so important to the CoCo 3 owner?

Frank: It is the most powerful development system I have ever seen on any computer. There are versions of *Sculptor* running on more than 40 different computers and the programs written in it are compatible between the different machines.

You could develop *Sculptor* programs on your $200 CoCo 3 at home, carry the program to a million dollar VAX at work and run it without any modifications! No other development system can do that. Plus, the development time is incredibly short. You can develop applications using *Sculptor* in about one tenth the time it would take with most other languages.

"Many people believe that OS-9 will never be popular because it is not compatible with the IBM PC. We don't agree!"

Dale: What kind of applications can you develop with *Sculptor*?

Frank: Most people use *Sculptor* when they need an application that can access a large amount of data from several different databases very quickly. We have packages written in *Sculptor* that can manage a dental office, a real estate office or manage property. We use other *Sculptor* programs to maintain general ledgers, record accounts receivables, and manage accounts payable. We also have clients using *Sculptor* for church management and mailing list management. All of these programs run on *Sculptor* and are very fast. They can access over 22 million records. And, any one of these records can be retrieved from a hard disk in less than a second.

Dale: How will *Sculptor* on the CoCo 3 differ from *Sculptor* on the GIMIX III?

Frank: Actually, *Sculptor* will appear to run faster on the CoCo 3 because of the windows. Keep in mind that the GIMIX III runs at almost the same clock speed as the CoCo 3 but doesn't have windows. To match the CoCo 3, the GIMIX would need to have several terminals hooked to it.

Dale: How will you use the CoCo 3 windows with *Sculptor*?

Frank: Imagine you run a mail order business and need to do a lot of typing and other standard office chores. For starters, you will want a hard disk to keep your business records. Even though you can keep many records on a floppy disk, business people need to have enough storage on line to hold all of their information and they need to get at it fast. With a hard disk and *Sculptor* you have this ability.

When you first bring the system up, you may start an invoice program in the first window. Then, open another window and start the word processor. Then, you may create another window to run a few maintenance programs. At any time you can press one key and instantly move to another window! You can bounce back and forth from one to the other at will, doing whatever is necessary along the way.

Dale: Why is it important that *Sculptor* is compatible with other computers?

Frank: Look at all the people who have written their software in BASIC. If they need to switch to another computer, like an IBM PC, they will have a major rewrite on their hands. With *Sculptor* running under 40 different computers — and the list is growing daily — that problem just doesn't exist. No businessman knows what his computer needs will be three years from now and *Sculptor* gives him the flexibility to move his applications to another machine at any time. Of course, it is the logical choice for developers for the same reason.

Dale: What do you think of the future of the CoCo 3?

Frank: It will be long and good. Most people don't realize the CoCo 3's potential at this time and it will take several years before it starts to reach its limit. The future looks very, very good indeed.

Dale: How important is OS-9 to the CoCo 3's success?

Frank: Vital! Absolutely vital! Without OS-9 you lose the windows, the multitasking and the programs like *Sculptor*. BASIC is only good for small jobs and has a very limited future. OS-9 is definitely the only way to fly.

Dale: What else will FHL be selling for the CoCo 3?

Frank: We are working on a *WordStar* clone for both OS-9/6809 and OS-9/68000. Because *WordStar* is so popular and has so many books and training programs available to support it, we think it will make a nice product.

Many people believe that OS-9 will never be popular because it is not compatible with the IBM PC. We don't agree! Instead of trying to run IBM software, we are going to market OS-9 software that operates like IBM software. However, because of OS-9's superiority, the program will do many *things* that IBM versions will never be able to do.

Dale: How do you rate the CoCo 3 against the PC?

Frank: The CoCo 3 runs circles around the IBM PC. But, it is unfair to compare a silk purse to a sow's ear. The CoCo 3, with its windows, OS-9 Level II, and our QT CoCo hard disk — if you will — is powerful enough to run a good sized business.

> ***"The thing that excites me about* Multi-View *is the fact that it creates conventions for data interchange that developers would be fools not to use."***

Dale: What is the QT CoCo?

Frank: It is a hard disk and floppy disk system for the CoCo 3 or CoCo 2 that is based on our QT.

Dale: I don't get it, why the QT?

Frank: The QT without the computer board is probably the smallest disk drive enclosure with a solid power supply and provisions for both a hard disk and a floppy you can buy. It can also be upgraded to a full 68000-based QT computer system at any time.

Dale: What do you get when you buy a QT CoCo?

Frank: You get everything that is in a QT except the computer board. You get the case, a double-sided floppy drive, a 20-megabyte hard drive, a controller, a power supply, cables, etc. These are the exact same parts that are used in the QT. They go through the same testing and quality control. We just leave out the parts that are only needed for the QT. This means nothing is wasted later if you want to upgrade to the QT. The system is fan cooled and has a power supply much more powerful than even the QT needs. In fact, the power supply alone costs more than a CoCo 2 costs today.

Dale: Why would you want to buy a QT CoCo instead of another hard disk drive?

Frank: There are several reasons. First, there's the size. The QT CoCo is very small — less than half a cubic foot. Besides the CoCo 3, it's all you'll need on the desktop. One of the things that has always bothered me about the CoCo is all the little boxes and wires that you need to make a complete system. With the QT CoCo, you reduce the number of boxes and that creates a more professional appearance and takes up less desk space. Another reason is reliability — the QT has been out for two years now and it has proven to be a very reliable computer. Using this same technology in a hard disk system brings that reliability to the CoCo. Of course, the QT CoCo is the only hard disk system that can be upgraded to a full 68000-based computer later and that should be important to you if you think you will ever want to move up to a bigger system.

Dale: What do you lose when you upgrade to a QT?

Frank: I didn't mean to imply that everything is used. Only the parts in the QT case itself can be used. You also need a controller for the hard drive and a floppy disk controller if you don't already have one. We are selling the Disto controller and SASI interface because they both fit in a case the size of a Radio Shack disk controller. This means that you don't need to install a multipack to use the system. The Disto hard disk interface also gives you a serial interface that you can use with a printer or terminal at full speed without losing characters. All in all, Tony has built a great system. If you upgrade later you can still use the Disto floppy controller. You will only lose the use of the SASI interface card.

Dale: If you do upgrade to a QT, how do you convert the files on the hard disk to the QT?

Frank: You don't need to! The 68000 OS-9 file format is the same as the 6809, so the QT can read the hard disk without any reformatting.

Dale: What does it cost?

Frank: The price isn't firm yet. But, it will be less than the price Tandy charges for their 15-Meg hard disk. You will be able to get a floppy and a 20-Meg hard disk, plus controller, plus the potential for upgrade to a QT later for less money than you would pay Tandy for their 15-Meg hard disk!

Dale: How else will you be supporting the CoCo 3?

Frank: On the hardware side, we are already selling 512K upgrade boards, disk controllers and complete disk drive systems. On the software side we will be marketing *FBU*, a high performance hard disk backup utility; *QCom*, a communication program that uses the Xmodem protocol and two additional utilities, *ULD* and *DLD*, which let you upload and download files quickly.

Dale: What is *FBU*?

Frank: *FBU* is designed to back up a hard disk to a number of floppy disks. It is optimized for speed and uses a minimum number of floppies because it compresses your files before it saves them. *FBU* comes with a utility named FRS which restores your files to the hard disk, creates directories, and sets all the attributes, owner IDs and dates.

Dale: What about your communications programs?

Frank: *QCom* lets you send or receive straight ASCII text files. It also lets you upload or download any file using the Xmodem protocol or simply chat on line. *DLD* and *ULD* give you a way to transfer programs to or from your CoCo 3 when you are communicating with another computer. They also use the Xmodem protocol.

My First Look at Level II

"OS-9 Level II has to be the software bargain of the decade," said Tandy's Mark Siegel as Bruce Warner and I followed him into a private room at the Hyatt in Princeton. "Where else can you buy all this power for $79.95?"

After seeing Level II, Warner and I both decided that Siegel's remark had to be the biggest understatement of the year. We only got to watch the CoCo 3's new operating system perform for about 30 minutes, but we liked what we saw.

Siegel created a few windows with short command lines from the OS-9 prompt. After he had filled the screen with windows he started a new shell in the largest window. The command sequence looked something like this:

```
OS9: montype m
OS9: iniz w7
OS9: ex shell i=/w7
```

At this point, approximately 48K of memory remained free in the 128K machine we were using. Siegel remarked that he had created up to 14 windows with shells and applications running in them in a 512K machine.

While we watched, Siegel started shells in each of the three windows he had opened and ran a different utility in each — concurrently. He toggled

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Level 2	Grades 6-8
Level 3	Grades 9-12

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Each reading program contains about 50 situational paragraphs with one key word missing. Child uses context clues to find correct answer in multiple choice format. Random selection of readings each round. Specify 4th, 5th, 6th, or 7th grade.

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between the windows by striking a single key on the new CoCo 3 keyboard. We were impressed.

Siegel told us that with the new Level II OS-9 software, contiguous memory would not be needed for programs. However, it is needed for windows. We also learned that OS-9 Level II looks for a file named `Autoex` and that we would probably be running out of memory for process descriptors before we run out of memory for our programs. Yet, he said at one time he had run 28 individual processes before he ran out of memory.

We also learned that we would no longer be able to load drivers for new devices and then run them. We would need to use `OS9Gen` to put them in a new `OS9Boot` file. Level II OS-9 has a mouse driver built in. But, if you don't like mice, you can use the keyboard as a pseudo-mouse. A special joystick adapter that plugs into the joystick port and sells for $9.95 lets you point your mouse at any one of the 640 individual pixels in a line when you are running your CoCo 3 at its highest resolution.

Even though the OS-9 Debug utility will no longer come with the basic OS-9 release, you will still be able to patch modules in memory using a special utility named ModPatch. It will update the CRC for you automatically and eliminate the need for the separate verify step. Debug will now be part of the development package. By the way, you'll still be able to do plenty of reading when you move up to OS-9 Level II. The new manuals promise to be about 700 pages long — would you believe they started out at 900 pages?

One of the most exciting things about OS-9 Level II and the CoCo 3 is the part we didn't get to see. Siegel didn't get to show us *Multi-View* at Princeton because there weren't any 512K machines around to use for a demo.

Multi-View is an enhanced windowing environment designed specifically for the CoCo 3. It gives a common, graphics-based environment to run your application programs in. Title bars, menu bars, pull-down menus and dialog are all built into the system. This graphics shell lets you select picture-oriented commands (most people call them icons) to run your programs. A number of desktop utilities, or tools, are a keystroke away. An alarm clock, calculator, calendar/memo book, control panel and clipboard support are all built in. Two other accessories let you configure your printer or call for help at any time.

The thing that excites me about *Multi-View* is the fact that it creates conventions for data interchange that developers would be fools not to use. This means that the OS-9 programs of the future will have a central look or feel because they will use the same methodology. You, the end user, will be the real victor because you will only need to learn how to save data with an OS-9 application one time. Why? Because, all OS-9 software will carry out similar functions in a similar way. In a nutshell, you will save your data in your spreadsheet the same way you save your data in your word processor, etc. Other standard operations will also be done the same way across the spectrum of application software.

Yet, Microware and Tandy have designed the OS-9 Level II system on the CoCo 3 so that they can be flexible in the future. If the industry standard "user interface" changes in a few years, they will be able to write a new one. The internals of the operating system will

Listing 1: `filesize`

```
 ifpl
 use ..../defs/os9defs
 endc
type set sbrtn+objct
revs set reent+1
 mod length, name, type, revs,st
art,mem
 org 0
stack rmb 250
mem equ .
name fcs /filesize/
pcount equ 2
pathaddr equ 4
hiaddr equ 8
loaddr equ 12
start ldd pcount,s
 cmpb #3
 beq L01
 ldb #56
error coma
 rts
L01  ldd [pathaddr,s]
 tsta
 beq L02
 tfr a,b
L02 tfr b,a
 ldb #2
 os9 I$getstt
 bcs error
 stx [hiaddr,s]
 stu [loaddr,s]
 clrb
 rts
 emod
length equ *
 end
```

Listing 2: `filepir`

```
 ifpl
 use ..../defs/os9defs
 endc
type set sbrtn+objct
revs set reent+1
 mod length, name, type, revs,st
art,mem
 org 0
stack rmb 250
mem equ .
name fcs /fileptr/
pcount equ 2
pathaddr equ 4
hiaddr equ 8
loaddr equ 12
start ldd pcount,s
 cmpb #3
```

stay the same and won't need to be changed.

The Race Is On!

The race has already started among CoCo 3 third-party hardware vendors. Three vendors have announced 512K upgrade boards for the CoCo 3.

Bob Rosen at Spectrum Projects is selling his for $139.95. It uses 16 prime 256K DRAMs. You can buy it without the RAM chips for $99.95.

Tony DiStefano, who designs hardware for CRC, Inc., has released his 512K board also. It sells for $129.95.

And finally, Frank Hogg at FHL is selling the PBJ 512K upgrade for the CoCo 3 at $129.95. FHL sells the bare PBJ board without the memory chips for $49.95.

Another *Utilipak*

Steve Goldberg continues to improve his *Utilipak* software. Now, new customers can buy *Utilipak, Sr.* for $20. What a bargain! For the price you get 40 utilities. And Goldberg hasn't forgotten *Utilipak* veterans. They can upgrade their package by sending a blank disk, a postage paid mailer and $7 to Goldberg at 695 Plainview Road, Bethpage, NY 11714.

Goldberg no longer sends a printed manual with his bargain basement utilities. Rather, he puts it on your disk and gives you a procedure file which will print it automatically. *Utilipak, Sr.* is a combination of *Utilipak* and *Utilipak Too*. It supercedes both by replacing a number of existing programs, adding better error handling and enhancements to others. Many of the original utilities run much faster. Especially notable are improvements to Grep, Pk, Unpk, Crypt, Head and Tail.

Skala Discovered

Back in July we mentioned some 256K RAM disk drivers for *The Banker*. They were written by Dennis Skala and are available in the OS-9 database on RAINBOW's Color Computer SIG on Delphi. Since then we have received several dozen requests for Dennis' address. Here it is: 5423 West Sebago Drive, Fairview, PA 16415. Be sure to say thanks!

CoCo 3 Programs Appearing Online

CoCo 3 OS-9 programs are starting to show up in the online databases. For example in the OS-9 database on our Delphi CoCo SIG, you can now find a CoCo 3 driver for your *Word-Pak II*. It was written by an OS-9 user named Connolly.

Connolly has also contributed a number of other utilities that may cause you to join the fun on the CoCo SIG. Included in the latest index compiled by OS-9 database manager Dale Lear are a file directory utility, an archive/restore utility set and *Make*, a UNIX-like development utility. He has also uploaded a *Make* script file that shows you how to patch a module. More than three dozen files have appeared since we first reported the increased activity last month. Join the fun.

On the CompuServe OS-9 SIG you can also find a number of new CoCo 3 programs in the database. The two most important this month are *CO380*, an 80-by-24 screen driver. It runs under OS-9 Level I, Version 2.00.00 and was written by Mike Dziedzic, 134 Driftwood Drive, Grand Island, NY 14072. It supports all OS-9 Level I, Version 2.00.00 control codes and some OS-9 Level II control codes — letting devel-

```
 beq L01
 ldb #56
error coma
 rts
L01  ldd [pathaddr,s]
 tsta
 beq L02
 tfr a,b
L02 tfr b,a
 ldb #5
 os9 i$getstt
 bcs error
 stx [hiaddr,s]
 stu [loaddr,s]
 clrb
 rts
 emod
length equ *
 end
```

Listing 3: demotest

```
PROCEDURE FileSizeText
DIM filename$:STRING
DIM path:INTEGER
DIM hi,lo:INTEGER

INPUT "Please give me a filename
: ",filename$
OPEN #path,filename$:READ
PRINT path,filename$

RUN filesize(path,hi,lo)
fs=hi*65536.+lo
RUN fileptr(path,hi,lo)
fp=hi*65536.+lo

PRINT "The file size is ",fs
PRINT "The file pointer is at ",
fp
END
```

Listing 4: unload

```
*------------------------------*
*            UNLOAD            *
*------------------------------*
*  Repetitive Unlink Command   *
*------------------------------*
*      (C) Copyright 1986      *
*        by Fred Sawtelle      *
*      3103 Montgomery Road    *
*      Huntsville, TX 77340    *
*         April 1, 1986        *
*------------------------------*

 nam Unload
 ttl Repetitive Unlink Command
```

opers get a head start before Level II is *released*. It also supports the *OPak* Hi-Res control codes so that you can run some of the older software, such as *DynaStar*, on your CoCo 2.

Another interesting CoCo 3 file is *CC3Fix*, a utility that lets you create an OS-9 Level I, Version 1.00.00 or Version 1.01.00 disk that will run on the CoCo 3. You boot the system normally, run *CC3fix* and then do a cobbler to a freshly formatted blank disk. This new system disk will boot directly on the CoCo 3 without the memory conflicts that previously caused Version 1.00.00 and Version 1.01.00 of OS-9 to crash. It was written by Kent D. Meyers.

***Unload*, *SysGo* for Version 2.00.00 and a BASIC09 Procedure**

Mark Roseman of 736 Queenston Street, Winnipeg, Manitoba, Canada, sent us a note with an assembly language program that you can use with BASIC09 to find the size of a file, or your current position within a file — a BASIC09 equivalent of `LOF` and `LOC` in Microsoft BASIC. To do the job, you use an OS-9 `I$Getstt` call. To call his routines, use a BASIC09 statement like this.

```
run filesize(path,hi,lo)
fs := hi * 65536 + lo
```

`Path`, `hi` and `lo` are all integer variables, or parameters, and `fs` is a real variable which holds the file size. A call to `fileptr` would be written in a similar fashion. For his program, see listings 1, 2 and 3.

This demo program asks you for a filename, then prints the size of your file and tells you where the file pointer is currently pointing. In the example it will still be pointing to the beginning of the file, or zero.

Both *SysGo* for Version 2.00.00 and *UnLoad* were contributed by Fred Sawtelle of 3103 Montgomery Road, Huntsville, TX 77340. Sawtelle is the author of several other utilities we published during 1986.

By the time I sit down to work on the March edition, I should have had some hands-on experience with OS-9 Level II on the new CoCo 3. We'll cross our fingers! Till then, enjoy! ☐

```
 ifpl
 use /d0/defs/os9defs
 endc

* CONDITION: use /d0/defs/os9def
s

*---- MODULE SPECS ----


TYP set prgrm+objct
REV set reent+1
 mod ZZ,MN,TYP,REV,GO,EDAT
MN fcs "Unload"
 fcb 1
 fcc "(C)1986FredSawtelle"

*---- DATA SPECS ----

TOP rmb 2
BOTTOM rmb 2
LEN rmb 2
TIMES rmb 1
 rmb 200
EDAT equ .

ERMSG fcc "ERROR: can't find "
ERMEND equ *

ERMSG2 fcc "ERROR: didn't unload
 "
ERM2END equ *

CGRTN fdb $070d

*---- EXECUTABLE CODE ----

GO stx TOP
```

```
os9 f$prsnam
bcs OUT
clra
std LEN
sty BOTTOM
os9 f$link
bcc GOTMOD
ERPRINT leax ERMSG,pcr
 ldy #ERMEND-ERMSG
 bra EP2
EP1 leax ERMSG2,pcr
 ldy #ERM2END-ERMSG2
EP2 lda #2
 os9 i$write
 bcs OUT
 ldx TOP
 ldy LEN
 lda #1
 os9 i$write
 bcs OUT
 leax CGRTN,pcr
 ldy #2
 os9 i$writln
 bcs OUT
 bra CKNEXT

GOTMOD lda #$10
 sta TIMES
UNLINK os9 f$unlink

 bcs OUT
 dec TIMES
 bne UNLINK
 clra
 ldx TOP
 os9 f$link
 bcc EP1
```

Telewriter-64™

the Color Computer Word Processor

- 3 display formats: 51/64/85 columns × 24 lines
- True lower case characters
- User-friendly full-screen editor
- Right justification
- Easy hyphenation
- Drives any printer
- Embedded format and control codes
- Runs in 16K, 32K, or 64K
- Menu-driven disk and cassette I/O
- No hardware modifications required

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

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Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

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64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

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RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

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CERTIFICATION
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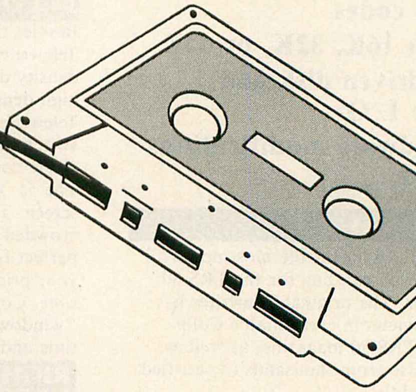

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```
CKNEXT ldx BOTTOM
 lda ,x+
 cmpa #$0d
 bne GO
 clrb
OUT os9 f$exit
 emod
ZZ equ *
 end
```

Listing 5: sysgo

```
*------------------------------*
* SYSGO 2.00.00 System Module *
*  Revised by Fred Sawtelle    *
*         May 28, 1986         *
*------------------------------*

 nam SysGo
 ttl Refined System Module
 ifpl
 use /d0/defs/os9defs
 endc

* CONDITION: use /d0/defs/os9def
s

*---- MODULE SPECS ----

TYP set systm+objct
REV set reent+1
 mod ZZ,MN,TYP,REV,GO,EDAT
MN fcs "SysGo"
 fcb $0d :revision

*---- DATA SPECS ----

 rmb 200
EDAT equ .

*---- STRINGS AND DATA ----

DDIR fcc "/d1"
 fcb $0d
XDIR fcc "CMDS"
 fcb $0d

SHELL fcc "SHELL"
 fcb $0d

START fcc "/d0/startup -p"
 fcb $0d

* NOTE: IF YOUR STARTUP FILE IS
*  IN YOUR EXECUTION DIRECTORY,
*  CHANGE PREVIOUS STRING TO:
*  START fcc "startup -p"
REBOOT fcb $55,0,$74
 nop
 clr $ff03
 nop
 nop
 sta $ffdf
 jmp $ef0e
RBEND equu *
```

```
*-------------------*
* EXECUTION ENTRY *
*-------------------*

*---- SIGNAL TRAP ----
GO leax RTI,pcr
 os9 f$icpt

*---- RESET VECTOR ----

 leax REBOOT,pcr
 ldu #$71
 ldb #RBEND-REBOOT
GETBOOT lda ,x+
 sta ,u+
 decb
 bne GETBOOT

*---- SET DIRECTORIES ----

 leax XDIR,pcr
 lda #4
 os9 i$chgdir
 leax DDIR,pcr
 lda #3
 os9 i$chgdir

SETPRIOR os9 f$id
 ldb #$80
 os9 f$sprior

*---- RUN STARTUP ----

 leau START,pcr
 ldy #$15
 bra NS1

NEWSHELL ldy #0
NS1 leax SHELL,pcr
 ldd #$100
 os9 f$fork
 bcs SHELLERR
 os9 f$wait
 bcc NEWSHELL

SHELLERR bra SHELLERR

RTI rti

 emod
ZZ equ *
 end
```

BITS AND BYTES OF BASIC

The CoCo 3 Color Palette From a BASIC Program

By Richard A. White
Rainbow Contributing Editor

With 64 colors to choose from, things can get confusing fast. The *Sample 23* program in the manual displays all available colors, eight at a time. This will get you started, but the next question is, how does one color look next to a similar one on a different screen? The answer is to write a program in BASIC. This kills two birds with one stone. It meets my needs and also serves as a tutorial on how the palette works and how some of the new BASIC commands that deal with high resolution screens work.

We will work in the 16-color, 320-by-192 graphics mode. The idea is to draw 16 boxes in buff on a black background. Each box is to be filled, in order, from the palette so that each color in the palette is shown. Since we can print characters to this screen, we will number each box with the palette slot it is referencing and print the number of the color displayed in each slot.

The program starts with a little housekeeping. The `DIM CC(15)` in Line 5 establishes a numeric array that will keep the number of the color in each palette slot. The array numbers relate directly to the palette slot numbers. `POKE 65497,0` sets the microprocessor speed to 1.8 MHz. `POKE 65496,0` will reset the clock to .9 MHz.

There are two different default palette color selections based on the fact that televisions and composite video monitors display colors differently from the CM-8 Analog RGB Color Monitor. Line 8 prints the question about an RGB monitor and the `INKEY$` statement in Line 10 looks for a Y or N answer. Note that Line 10 is written so that only a Y or an N are accepted and that any other letter, including all lowercase entries, sends the program back to the start of Line 10.

Users with anything other than a CM-8 monitor should enter an N. When N is pressed, the program does a `RESTORE` to assure that the data pointer is reset and then enters a `FOR-TO-NEXT` loop to read `A` 16 times. The data in lines 2000 and 2010 are the default color numbers for the RGB monitor in Line 2000 and for TV or composite video in Line 2010. When `READ A` has been done 16 times, the data pointer is positioned to the first data item in Line 2010. Then the `PALETTE CMP` command sets the palette to the composite video default.

If Y is chosen, the program restores the data pointer and does a `PALETTE RGB`, which loads the RGB default palette colors.

Well, this almost works. There is a small bug. It is not apparent if one simply switches from the CMP to the RGB color set, since Slot 15 is filled with Color 38 in both instances. If Slot 15 is loaded with some other color, the commands `PALETTE RGB` and `PALETTE CMP` do not reset Slot 15 to Color 38, but leave it unchanged. Once you have this program running, change the color in Slot 15, break and rerun the program. You will see all the default colors except in Slot 15 which remains the color you previously set.

If, however, you use the reset button to break the program, you will find Color 38 in Slot 15 when you rerun the program. The reset button resets the machine to the CMP default colors including Slot 15, which will contain Color 38.

Add `20 HCOLOR4,8:HSCREEN2`.

An `HSCREEN` command is used to both clear and display a CoCo 3 high resolution graphics screen. You have five choices:

`HSCREEN0`	Low resolution
`HSCREEN1`	320 X 192, 4-color
`HSCREEN2`	320 X 192, 16-color
`HSCREEN3`	640 X 192, 2-color
`HSCREEN4`	640 X 192, 4-color

The `HCOLOR C1,C2` command sets a foreground color, C1, and a background color, C2. Color numbers range from 0 to 15 and refer directly to the palette slot numbers. The default uses Slot 1 for the foreground and Slot 0 for the background. I felt the colors would show up better against a black background (Slot 8), and used buff for the foreground, Slot 4. So, in Line 20, `HCOLOR 4,8` picks my choices and `HSCREEN2` puts us in the graphics environment. Note that these color choices hold only as long as buff and black remain selected for slots 4 and 8.

`HSCREEN0` appears to be the way for the program to break out of graphics to get back to a text screen. Since `HSCREEN` clears the screen with the then-current background color each time it is used, there is no way for BASIC to draw a hidden graphic and then display it like you can using `PMODE` and `SCREEN` commands in the CoCo 2 mode. The CoCo 3 way to do this is to set all the palette slots to the same number, issue an `HSCREEN` command and then follow with the code to generate the graphics. Use `HCOLOR C1,C2` to set new foreground and background colors for `PSET` and `RESET` when used with `HLINE`, `HPUT`, `HSET` and `HRESET`. Next, use `FOR X = 1 to 15 : PALETTE X,C2 : NEXT` to set all palette slots to the same color. Now, where a color number is used in a command, use any palette number in the 0 to 15 range. Since all the colors

Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the coauthor of the TIMS *database management program.*

in the palette are the same, the screen will remain clear. When it comes time to display the graphic, load the desired color numbers into their palette slots and the picture instantly appears.

A variation on this strategy is to load colors into the palette in such a way as to make the picture grow and change on the screen. The dragon sequence in Radio Shack's CoCo 3 demo is an outstanding example of this technique, where the room comes slowly into being and wall colors lighten as torches along the walls are lighted. The torch light is made to flicker and dance just by changing palette slot color assignments. The changes are subtle, increasing their effectiveness. Although the demo is a machine language program, the types of changes used in this sequence are slow enough that BASIC will easily handle them. This sequence also illustrates the fact that the 64-color selection and the 16 colors available at a time will meet all but the most exacting needs. Scenes tend to be bright or drab or pastel, but not all these things at the same time. One color set works well in a dungeon while an entirely separate set is needed for an outdoor scene.

Line 30 uses `HLINE` to draw horizontal lines in the upper, center and lower parts of the screen. In the first parentheses is the X,Y location of the start of the line. The 0,0 position is the top-left corner of the screen. The X dimension is horizontal and ranges from 0 to 319, increasing to the right. The Y dimension is vertical and ranges from 0 to 191 increasing from top to bottom. `PSET` draws in the pre-selected foreground color slot. `RESET` draws in the pre-selected background slot. A slot number (0 to 15) may be used in place of `PSET` or `RESET`.

`HLINE` also may be used to draw a box by using 'B' parameter. The syntax is `HLINE (x1,y1)-(x2,y2),PSET,B`. You can also fill the box with the color of the outline using `HLINE (x1,y1)-(x2,y2),PSET,BF`. Of course, all of this is the same as CoCo 2 Extended BASIC.

Line 40 draws vertical lines to generate 16 boxes. Line 50 first paints the top row of boxes with colors from slots 0 to 7 and then does the same to the bottom boxes using colors 8 to 15. This is accomplished using `HPAINT (x,y),C1,C2`. Of course X,Y defines the pixel where painting is to start. The color to use is put into the C1 location. Color C2 is border color where painting is to stop. Remember colors C1 and C2 really refer to palette slots. At the same time the color number for each color *is read into* the array `CC(X)`.

Cheers are in order. CoCo 3 Extended BASIC lets us print text anywhere on a graphics screen. In the 320-by-192 mode the 40-column character set is used while the 80-column set is used in the 640-by-192 mode.

Enough celebration — how does it work? `HPRINT(X,Y)` prints text starting at X column and Y row. Note that it uses columns and rows and not pixel positions. This is consistent with the way the `LOCATE X,Y` command works when moving the cursor on a text screen. In Line 60, `HPRINT(8,0),"CURRENT PALETTE COLORS"` prints the string starting at Column 8 in Row 1.

The string may be defined in an `HPRINT` statement or be held in a string variable. In Line 70, text is assigned to string variables `ST$` and `SB$`, which are then printed by the `HPRINT` statements in Line 80. The function here is to print `S0` through `S7` above the top row of boxes and `S8` through `S15` beneath the bottom row to identify palette slot numbers.

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The next task is to print the color number directly above or below the slot number. Since we are starting with a default color set, I was able to put the color numbers for the default colors into DATA statements, which were subsequently loaded into the numeric array, CC(X). To generate a string containing a color number, the expression CC$ = "C"+STR$(CC(X)) is used and the result will have the form "C ZZ" since STR$( ) adds a leading space when converting positive numbers. The top row of color numbers is printed using the FOR-TO-NEXT loop in Line 90 while the bottom colors are printed in Row 22 using the code in Line 100. Since the loop in Line 90 starts with 0, the "C ZZ" strings will start in Column 0 and be printed at five column spaces. In Line 100, the FOR-TO-NEXT index starts at 8, so 8 must be subtracted from X in the HPRINT statement. This is why there are separate lines to print the top and bottom rows.

> *"Cheers are in order. CoCo 3 Extended BASIC lets us print text anywhere on a graphics screen."*

The high resolution graphics use HGET and HPUT in the same way GET and PUT are used in CoCo 2 Extended BASIC. A nearly 8K memory space is allocated in the 64K memory block that contains the high resolution screen memory. HBUFF *buffer,size* allocates a portion of the 8K block to a buffer where *buffer* is a number and *size* is the number of bytes. Determining the number of bytes required is the confusing part.

The manual approaches the question by defining the number of dots or pixels a byte of memory can define. Read and digest that approach, then read the following where I will try a bit different tack.

Let's start with bits. A bit may be on or off. This is a two-state system. In a two-color graphics mode, the foreground and background colors are preset. It is then sufficient to know that a dot should be on or off. If the dot is to be on, it is set to the foreground color. If it is to be off, it is set to the background color. HSCREEN 1 sets a two-color, 320-by-192 mode where the default foreground is set for Slot 1 and the default background is set to Slot 0. You can change this with HCOLOR C1,C2 discussed earlier. HSCREEN 2 used in the program is a 16-color mode that requires four bits to relate any of the 16 palette locations to the dot.

Now let's look at the HGET statement in Line 190 which says HGET(0,0)-(20,8),2. The 0,0 to 20,8 area encompasses eight rows of 20 dots each. In a two-color mode where each dot needs only one byte of data, each row of dots would need only two and a half bytes. However, since it is necessary to move even bytes, this rounds up to three bytes. But, the row might not start on a byte boundary. It might start at the end of one byte, bridge two other bytes and end in a fourth byte. So in a worst-case situation, four bytes might be required. With eight rows, a simple multiplication of 4 times 8 yields 32 bytes. The manual says add 1 to the row number and then do the multiplication and we get 36 bytes. The manual further states the size is 1 less than the calculated size, so the buffer allocation statement would be HBUFF 1,35.

The method in the manual tries to sort out the cases where the row of dots only bridges three bytes and allows a reduced buffer allocation.

Multiple color modes need more of each byte to store their color information. A four-color mode needs to store four states, which can be done with two bits, so each byte defines four dots. The 16-color, 320-by-192 mode needs to store 16 states, which requires four bits. Each byte only defines two dots.

In the HSCREEN 2, 16-color mode, at least 10 bytes are needed to save a row of 20 dots. If the row had run from 1 to 21, 11 bytes would actually have been involved. Following the book, eight rows plus one yields a multiplier of 9 and a block size of 99. In Line 190, I properly used a size of 99 minus 1, or 98. Unfortunately, there is evidence that buffer sizes calculated by the book do not always work. A friend defined three 98-byte buffers in three successive lines of code. His machine hung up. He changed the first line to HBUFF 1,99 and the program ran, even though the following two lines used HBUFF 2,98 and HBUFF 3,98, and the HPUT statement was identical in all three cases.

I originally made a mistake and defined the buffer in Line 110 as HBUFF 2,807 when the correct code is HBUFF 2,908 and the program ran fine on my machine. I have no assurance that it will run on someone else's machine. It seems irrational, but that's what the data I have now says. How about some of you CoCo 3 owners experimenting with this? Write if you find enlightenment.

Obviously, things are flaky with HBUFF. If you have trouble, first make sure you have properly calculated the buffer size. If you have, add 1 to that size. In fact, if you share your programs perhaps the prudent course is not to subtract that last 1 from the buffer size. Two error modes have been documented at this time. First, the machine may hang up and require use of the reset switch. If the buffer size given is too small, an FC Error results, providing BASIC chooses not to accept the definition — and BASIC seems to be doing some funny choosing these days.

Lines 200 through 215 simply use INKEY$ to get the number of the slot where you want to change a color. The single-digit or two-digit number is kept in variable SL$ as a string. VAL(SL$) is used to put that number into a numeric variable SL, which is tested to assure that it is within the 0 to 15 range.

When we did the HGET to fill Buffer 1, we got a buffer full of background color referencing Slot 8 in the palette. Now we use HPUT(0,184)-(200,192),1,PSET to blank the slot number question-and-answer text. When you HPRINT to a graphic, BASIC draws each character using the foreground color active at the time. Only those dots actually defining the character are written. HPRINTing a string of spaces changes no dots which may already be on the screen. So, it is necessary to actually HPUT background color over characters to erase them. Next, we HPRINT the slot number chosen and ask for a color number. It is held in CC$ and CC and is tested to assure it is within the 0 to 63 range.

In Line 250 the color in Palette Slot SL is changed to CC. The rest of the line is housekeeping to erase the text on the bottom line of the screen. Lines 255 and 260 are used to erase the old color number and write the new one at the changed slot display. The program then returns to get another change.

1000 GOTO 1000 is a programming aid. It locked up the program so I could see the results of each piece of code as I wrote it. Of course, pressing BREAK returns to the text screen for changes or more programming. If you type in the program, put Line 1000 in first and then simply type RUN from time to time to see if things are working right.

At this point, I am very favorably impressed with the CoCo 3, its graphics and the CM-8 monitor. Colors on a color TV before the monitor arrived were neat. Colors on the monitor are awesome for a system of its cost. It runs rings around the Tandy 1000. Thanks to Mike Dziedzic, 134 Driftwood Dr., Grand Island, NY 14072 and his *TERM380* and *CO380* driver and device descriptors under OS-9 Version 2.0, I am writing this using *DynaStar* running with the 1.8-MHz clock on an 80-character screen, black on light blue. Sorry Mike, but I don't like buff on dark blue. The character set is much better than the one I saw on a Tandy 1000 a few hours ago. I think I may change my start-up file so I have a buff background. □

The listing: `BASICPAL`

```
5 DIMCC(15):POKE65497,0
8 PRINT"ARE YOU USING AN RGB MON
ITOR? ";
10 ANS$=INKEY$:IFANS$=""THEN 10
ELSEIFANS$="N"THEN RESTORE:FORX=
0TO15:READA:NEXT:PALETTECMPELSE
IFANS$="Y" THENRESTORE:PALETTERG
B ELSE 10
20 HCOLOR4,8:HSCREEN2:CLS
30 HLINE(0,26)-(320,26),PSET:HLI
NE(0,96)-(320,96),PSET:HLINE(0,1
66)-(320,166),PSET
40 FOR X=0TO320STEP40:HLINE(X,27
)-(X,165),PSET:NEXT
50 FORX=0TO7:READCC(X):HPAINT(20
+X*40,27),X,4:NEXT:FORX=8TO15:RE
ADCC(X):HPAINT(20+(X-8)*40,97),X
,4:NEXT
60 HPRINT(8,0),"CURRENT PALETTE
COLORS"
70 ST$="S0   S1   S2   S3   S4
 S5   S6   S7":SB$="S8   S9   S1
0  S11  S12  S13  S14  S15
80 HPRINT(0,2),ST$:HPRINT(0,21),
SB$
90 FORX=0TO7:CC$="C"+STR$(CC(X))
:HPRINT(5*X,1),CC$:NEXT
100 FORX=8TO15:CC$="C"+STR$(CC(X
)):HPRINT(5*(X-8),22),CC$:NEXT
110 HBUFF1,908:HGET(0,184)-(200,
192),1
190 HBUFF2,98:HGET(0,0)-(20,8),2
200 HPRINT(0,23),"SLOT NUMBER TO
 CHANGE?"
205 I$=INKEY$:IFI$=""THEN205ELSE
HPRINT(24,23),I$:SL$=I$
210 I$=INKEY$:IFI$=""THEN210 ELS
E IFI$<>CHR$(13)THENSL$=SL$+I$
215 SL=VAL(SL$):IFSL<0 OR SL>15T
HENHPUT(0,184)-(200,192),1,PSET:
GOTO200
220 HPUT(0,184)-(200,192),1,PSET
:HPRINT(0,23),"SLOT "+SL$+"  NEW
 COLOR NUMBER?"
230 I$=INKEY$:IFI$=""THEN230ELSE
HPRINT(26,23),I$:CC$=I$
240 I$=INKEY$:IFI$=""THEN240ELSE
IFI$<>CHR$(13)THENHPRINT(27,23),
I$:CC$=CC$+I$
245 CC=VAL(CC$):IFCC<0 OR CC>63
THEN220
250 PALETTESL,CC:HPUT(0,184)-(20
0,192),1,PSET:HPUT(100,184)-(300
,192),1,PSET
255 IFSL<8 THENHPUT(16+SL*40,8)-
(35+SL*40,15),2,PSETELSEHPUT(16+
(SL-8)*40,176)-(35+(SL-8)*40,183
),2,PSET
260 IFSL<8THENHPRINT(1+5*SL,1),S
TR$(CC)+" "ELSEHPRINT(1+5*(SL-8)
,22),STR$(CC)+" "
270 GOTO200
1000 GOTO1000
2000 DATA18,54,9,36,63,27,45,38,
0,18,0,63,0,18,0,38
2010 DATA18,36,11,7,63,31,9,38,0
,18,0,63,0,18,0,38
10000 POKE65496,0:MOTORON:FORX=1
TO9000:NEXT:FORX=1TO3:CSAVE"CNGP
ALET":MOTORON:FORY=1TO600:NEXTY,
X:MOTOROFF
```

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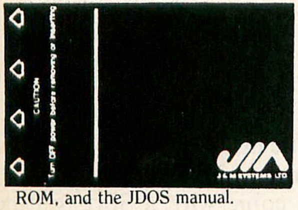

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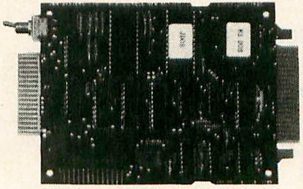

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TUTORIAL

Pipes and Filters for the Masses

By Bruce N. Warner

The OS-9 operating system is a very versatile environment. Perhaps most noticeable is that OS-9 gives you a multitasking and a true multiuser environment. There is a powerful feature in OS-9 that is often overlooked, a feature often misunderstood. OS-9 can handle pipes and filters!

"What are pipes and filters?" you ask.

Filters are programs that affect the output of another program. They may be used to sort the output, delete portions of the output, or add to the output. A pipe is the part of the operating system that connects the filter to the parent or master program.

Pipes and filters are tied to OS-9's ability to perform multitasking. They are essential for running two programs at the same time and converting the output from one program to the input for another.

The easiest way of getting a set of filters is by using what is called a toolbox. The toolbox consists of a number of programs that add flexibility to your OS-9 system. While *most* of the programs do very little on their own, they provide extra power for the overall system. There are any number of different OS-9 toolbox kits available. My preference is Computerware's *Textools*. Others are available from Frank Hogg Laboratory, Microware and D.P. Johnson.

The simplest example of the use of pipes and filters is piping something through a sort. This may come in handy when you are working with a large directory (such as a 5- or 10-Meg hard disk) or you have a large list in a file. We'll use the example of a directory. First, look what happens when you type `dir`. On my system it looks like this:

```
          Directory of /hd 10:15:05
OS9Boot     CMDS        SYS
startup     COBOL_PROGRAMS
STY         SPELL       print_sty
DEMOS       hd.driver   hd.descriptor
ASSEMBLY_SOURCE         DEFS
CMODEM      TEST        MORE
KS.RUN      WRITINGS    CONTACTS
hold1       hrdsk.listing
RS_DRIVES   STD_DRIVES
install     K.Dos.Fixed
kdos3.1     kdos.fix    SRC
```

Bruce Warner holds a bachelor's degree in computer programming, is president of the Northern Virginia Color Computer Club, and owns SoftWar, a documentation company. He is also an enlisted journalist in the U.S. Navy.

This is a fairly large directory, so it's difficult to see if a program or directory is there. You can find it, but with the breaks in the lines, you'll probably get confused. What do you do? For starters, you can use a program called *ls* (or a similar name under one of the other toolboxes) to get a directory that displays each of the files on its own line. It makes my directory look like this:

```
OS9Boot
CMDS SYS
startup
COBOL_PROGRAMS
STY
SPELL
print_sty
DEMOS
hd.driver
hd.descriptor
ASSEMBLY_SOURCE
DEFS
CMODEM
TEST
MORE
KS.RUN
WRITINGS
CONTACTS
hold1
hrdsk.listing
RS_DRIVES
STD_DRIVES
install
K.Dos.Fixed
kdos3.1
kdos.fix
SRC
```

This makes your directory a little more readable, but it still lacks a sense of order, which may be required for quick reference. Since most toolboxes come with a Sort routine, we can now take *ls* and "pipe" its output through a "filter" called *qsort* to give us a sorted version of the directory. The pipe command is represented by an exclamation point (!). The command line looks like this:

```
ls /hd ! qsort>/p
```

You can replace the `/hd` with any device name.

This runs the program *ls* using a hard disk drive as the input directory, pipes the output through the program *qsort* and redirects the output to the printer. Now the listing looks like this:

```
ASSEMBLY_SOURCE
CMDS
CMODEM
COBOL_PROGRAMS
CONTACTS
DEFS
DEMOS
K.Dos.Fixed
KS.RUN
MORE
OS9Boot
RS_DRIVES
SPELL
SRC
STD_DRIVES
STY
SYS
TEST
WRITINGS
hd.descriptor
hd.driver
hold1
hrdsk.listing
install
kdos.fix
kdos3.1
print_sty
startup
```

Notice that the order of the listing has changed. This is because the output from the *ls* program has become the input for the program called *qsort*, which put the listing in ASCII order. This looks better, but it still isn't an alphabetical listing of the directory, since the capital letters (A-Z) all come before the lowercase letters (a-z) when sorting in ASCII format (Z is before a). If you've filed your directories using the conventions recommended by experienced OS-9 users, this could be used to tell you that the first section of the *ls* output contains directories and the second section contains single files (provided you have properly named your files). The problem is that some files contain both upper- and lowercase characters. So what good will the filter do?

Your next option is to use another filter to change the listing to either all small or all capital letters. This will put the entire directory in alphabetical order. You will lose the identification of files and directories, but you'll know everything in any directory. Just type!

```
ls /hd ! lower ! qsort >/p
```

Again, the `/hd` can be replaced with your device. This executes the program *ls* to give a listing of all the filenames on the hard disk. The output will be piped through a program called *lower*, which converts all of the characters to lowercase. The output from *lower* is then piped through the program *qsort*. The *qsort* output is an alphabetical listing of the directory. The final output is then redirected to the printer. The new output looks like this:

```
assembly_source
cmds
cmodem
cobol_programs
contacts
defs
demos
hd.descriptor
hd.driver
hold1
hrdsk.listing
install
k.dos.fixed
kdos.fix
kdos3.1
ks.run
more
os9boot
print_sty
rs_drives
spell
src
startup
std_drives
sty
sys
test
writings
```

Now that you have an understanding of pipes and filters, take some time and see what you can come up with to increase the power of the OS-9 operating system. Try something like piping *dsave* through a shell.

(Questions may be directed to Mr. Warner at 14503 Fullerton Road, Dale City, VA 22193, 703-670-4962. Please enclose an SASE for a reply when writing.)

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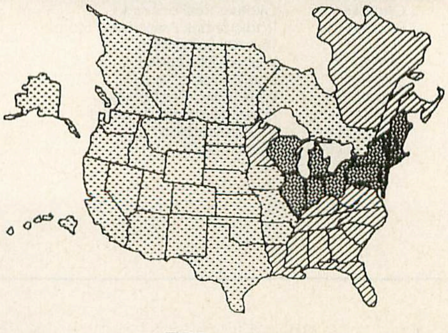

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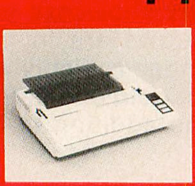

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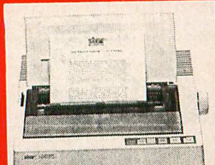

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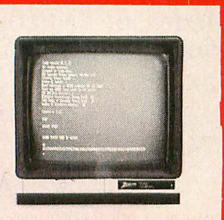

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(CoCo 3 does not require video amplifier.)

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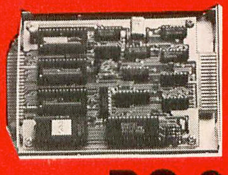

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- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

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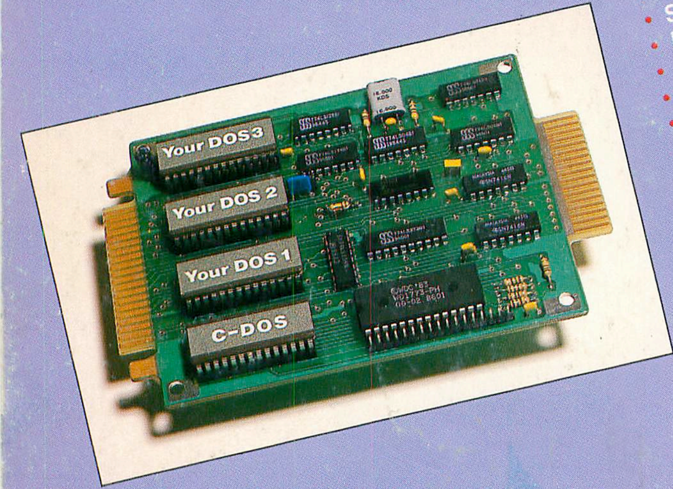

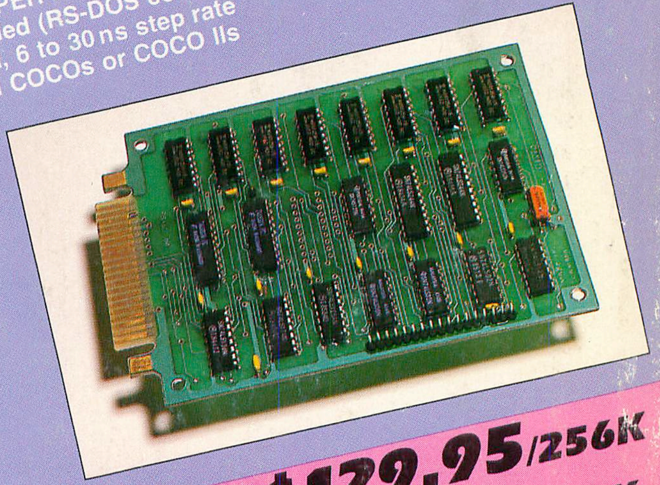

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